# American Machinist

SEPTEMBER 9, 1957 PRICE 75 CENTS

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION


## 116 WAYS TO JOIN TUBING

A SPECIAL REPORT, page 149

Aluminum transmission extensions for the Edsel—see page 2


New tools build the new Edsel, page 119

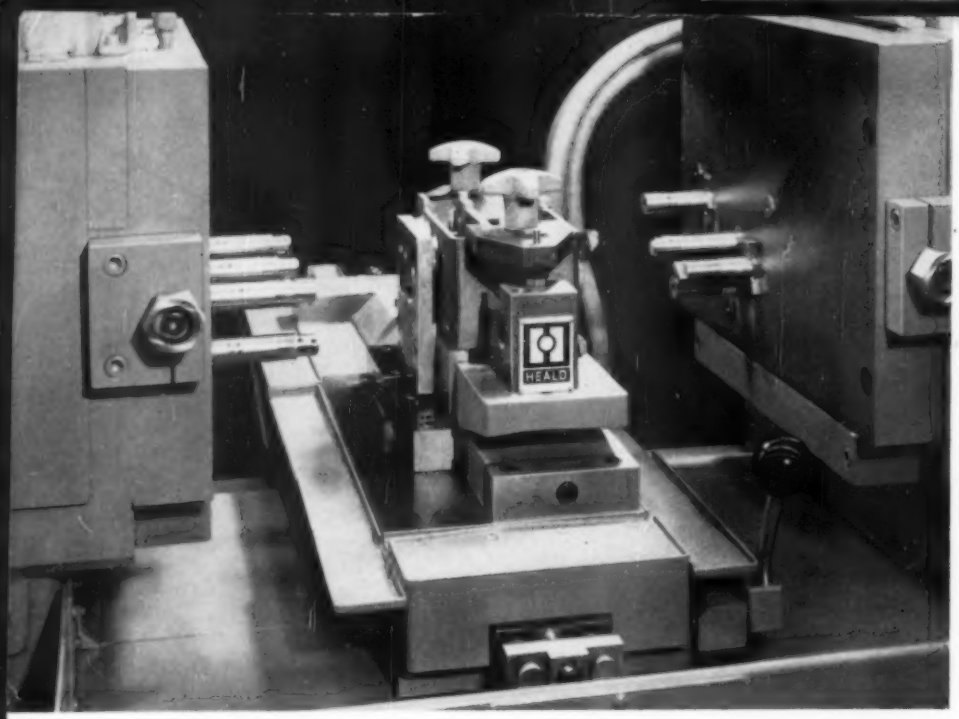
Can Ceramics cut superalloys? page 130

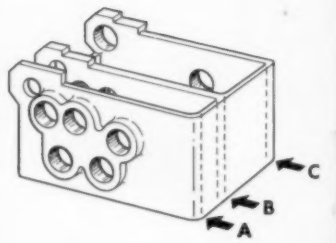
Are you using machinists as messenger boys? page 138

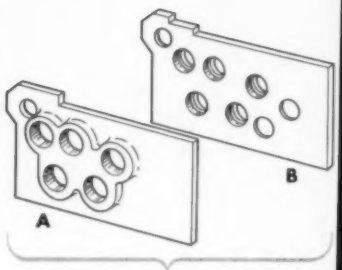
Flexibility in a press line page 140

NEWS INDEX, page 101

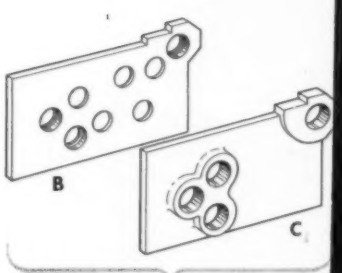
CONTENTS, page 1




Holes Borized on Left End




Holes Borized on Right End

## HOW TO BORIZE

# MULTIPLE HOLES

## ON CLOSE CENTERS

### in one fully-automatic cycle!

*New Multi-Spindle Boringheads make it as easy as A, B, C*

PRECISION boring of closely-spaced multiple holes used to be a slow and laborious job — done one-at-a-time on large, costly equipment that required highly-skilled operators. But not any more!

The new Heald Multi-Spindle Boringheads put high-precision, close-center borizing on a mass-production basis. Used with any Heald Bore-Matic, this Multi-Spindle head will precision Borize any practical number of holes, on centers as close as ¾", at a single pass of the table — and duplicate the same operation again and again.

A Multi-Spindle head unit consists of a supporting frame which mounts interchangeable spindle plates, precision bored to receive the required number and arrangement of miniature precision Red-Head boringheads.

Any or all boringheads, including the smallest size, ¾", can be provided with hydraulic cross-feed units operated from a single cylinder. Job changeover is simply a matter of switching spindle plates, and mounting the miniature boringheads required.

For the complete story on this important new development, send for Bulletin 2-021-022-1 Issue 1.

**HERE'S A GOOD EXAMPLE:**

The Model 122 Bore-Matic shown above is equipped with Multi-Spindle Boringheads on both ends, to precision finish close-center bores in a small transmission housing. Each head consists of a group of miniature, precision Red-Head boringheads mounted on spindle plates that are jig bored for precise location of each Red Head. The setup shown, with 5 heads on the left and 4 on the right, is designed to bore and face 17 different holes. All operations are performed in a single, fully automatic cycle, with just one chucking of the work, and no indexing. The surfaces finished at each end of the machine are shown in the "exploded" part drawings above.

*IT PAYS TO COME TO HEALD*

**THE HEALD MACHINE COMPANY**

Subsidiary of The Cincinnati Milling Machine Co.

**Worcester 6, Massachusetts**

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

HEALD®

—see page 2

American Machinist
McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

NEWS REPORT ..

. . . Spot News . . 101
. . . Washington . . 103
. . . Detroit . . 105
. . . Aircraft and Missiles . . 107
. . . Machine Tools . . 109
. . . What's Ahead . . 111
. . . General News . . 174
. . Field Report . . 180
. . . Names . . 183

Departments...

Letters . . 94
Editorial . . 115
Practical Ideas . . 144
Round Table . . 148
. . . Discussion . . 225
Talking Shop . . 173
New Equipment . . 184
New Books . . 262
New Films . . 266

## contents for September 9, 1957

VOLUME 101, NO. 18

**Detroit reautomates for '58 production . . .** Radical changes in the '58 cars have called for a tooling outlay of more than $1 billion. Here is a review of the major developments to introduce the series of articles on '58 auto production. *By George H De Groat.* . . . . . 117

**New tools for Ford's new Edsel . . .** Transfer machines with scrambled loading, automatic assembly, cold forming, and automated machining are features of the new lines. . . . . 119

**All grinders here use a standard coolant . . .** Alnico magnet castings are ground on many different machines, but with a central coolant system. . . . . 129

**Ceramics cut HSS; and show their weaknesses . . .** Results of tests on high-speed steel, superalloys, and titanium. *By John F McAuliffe, Pratt & Whitney Co.* . . . . . 130

**Slugging: idea and proof . . .** Five case studies show the advantage of cutting off bar stock before lathe operations. By *Charles Emerson.* . . . . . 134

**Are you using machine operators as messenger boys? . . .** If you are, here is a system that can save you time and money. *By E L Lund, Minneapolis-Honeywell Regulator Co.* . . . . . 138

**Flexibility in a semi-automatic line . . .** Notching, piercing, rolling, forming, and welding are combined in this cabinet line at Westinghouse. *By George H De Groat.* . . . . . 140

SPECIAL REPORT NUMBER 449

**Production man's guide to joining welded steel tubing . . .** 116 different ways to fasten one tube to another tube or to other parts. Both welded and mechanical joints are included. *By Product Development Committees, Formed Steel Tube Institute.* . . . . . 149

REFERENCE BOOK SHEETS

**Design of precision sprockets, I, II, III . . .** Camera-type sprockets are being adapted to computers. Here are the gear-tooth calculations for precision sprockets. *By Arthur Hill, Daco Instrument.* . . . . . 167

# American Machinist chips

**Cover . . .**
Aluminum transmission extension housings for the Edsel are loaded on a special Buhr machine at Ford's Livonia plant.
See details at left.

***Enter the '58's . . .*** Last week the new line of Edsel cars was introduced. This marked not only the culmination of several years' planning at Ford, but the first of this year's new models. George De Groat, our Detroit editor, has been following Edsel tooling plans closely. In our lead article he brings you the highlights of the new tooling developed for this new car. This is the first of a series of articles that will appear this fall, timed with the new model introductions, to bring you the most interesting tooling developments in the model changeovers. This first installment starts on page 119.

***One of the most unusual*** bylines ever to appear in *American Machinist* will be found on the Special Report in this issue. The report tells you 116 different ways to fasten two pieces of tubing together and the byline is the Product Development Committees of the Formed Steel Tube Institute. What is important to you is that this report gives you, in a convenient form never before available, a summary of the ways you can join tubing. But you may be interested in how this summary came into existence.

***"Why not compile a summary*** of all the ways to join tubing?" was the remark Andy Ashburn made to a member of the Institute last year in a discussion of the work being done by the FSTI. The idea was tossed to the two Product Development Committees and they jumped at it with alacrity. Once they started the research, it became evident why the job had not been done before. The committees found that there are two general methods, breaking down into 16 types and 116 specific methods to join welded steel tubing.

***"It scares us"***. . . One day a phone call from Pittsburgh, reporting on the progress of the job, brought the word, "We are about half through and we are getting so much information that it scares us." We said not to worry, make the job as complete as they possibly could, and we would find a way to publish it. They did finish the job, we developed a method of presentation that makes it easy to use this complex array of facts, and you'll find the results starting on page 149.

***Coming . . .*** *AM* for Sept 23 will include an unusually broad selection of articles. There will be detailed examples of the design of progressive dies and articles on titanium extrusions, instrumentation, material handling, gear deburring, jig and fixture construction, expediting, ultrasonic cleaning, and other subjects.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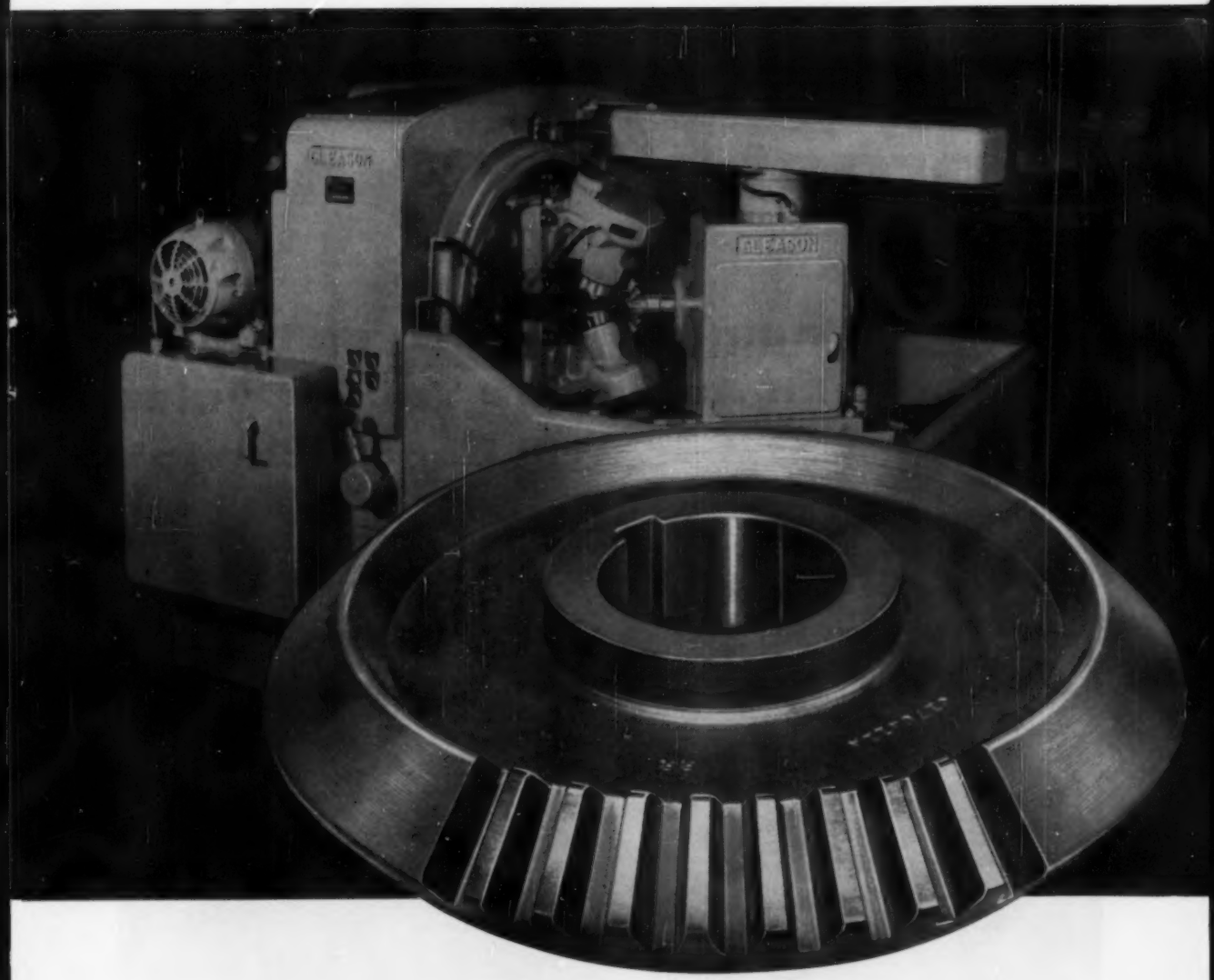


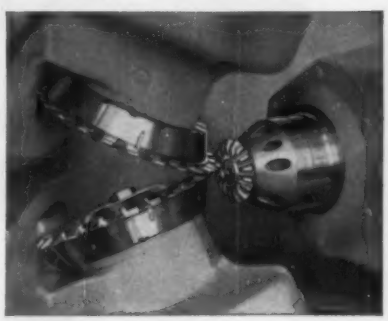

# A complete gear for a fifth of a gear!

It all depends on the gear, of course. But, by the time an earlier model generator has cut one-fifth of a gear, the new No. 104 Straight Bevel Coniflex* Generator has *completed* a similar gear!

You can increase your production by as much as 400% with this new Gleason machine. You can get these results because this generator has two interlocking disc-type cutters with twenty-four blades each. These cutters complete a gear in *one rapid operation!*

But that is not all. The No. 104 is easy to set up—it has a wide range of capacity—it is excellent for small quantities or volume production. And, a new generating method insures high efficiency, fine finish, and maximum cutter life.

Write us and we will be pleased to send you a bulletin and further information on the new No. 104 Straight Bevel Coniflex Generator.



*The No. 104 Straight Bevel Coniflex Generator completes gears up to 8½" diameter and 1⅜" face width, and from 20 to 3 DP.*

*Coniflex® straight bevel gears with localized tooth bearing.

**GLEASON WORKS**

*Builders of bevel gear machinery for over 90 years*

1000 UNIVERSITY AVE., ROCHESTER 3, N. Y.

# Forget about Variable

**Cincinnati Knee-Type Millers with Automatic Table Cycles will handle the job**

CINCINNATI

MILLING MACHINES • BROACHING MACHINES • CUTTER AND TOOL GRINDERS • SPECIAL MACHINE

# Lot Sizes . . .

Costs get a double-barrel blast from CINCINNATI® Knee-Type Milling Machines equipped with automatic table cycles. They combine many outstanding toolroom and production milling features . . . they are equipped to machine one part or several hundred at the lowest possible cost.

**For small lot production,** Cincinnati features are tops . . . directional controls; wide range of speeds and feeds selected in a few seconds; automatic disengagement of hand cranks when power feed is engaged; an excellent choice of attachments and accessories.

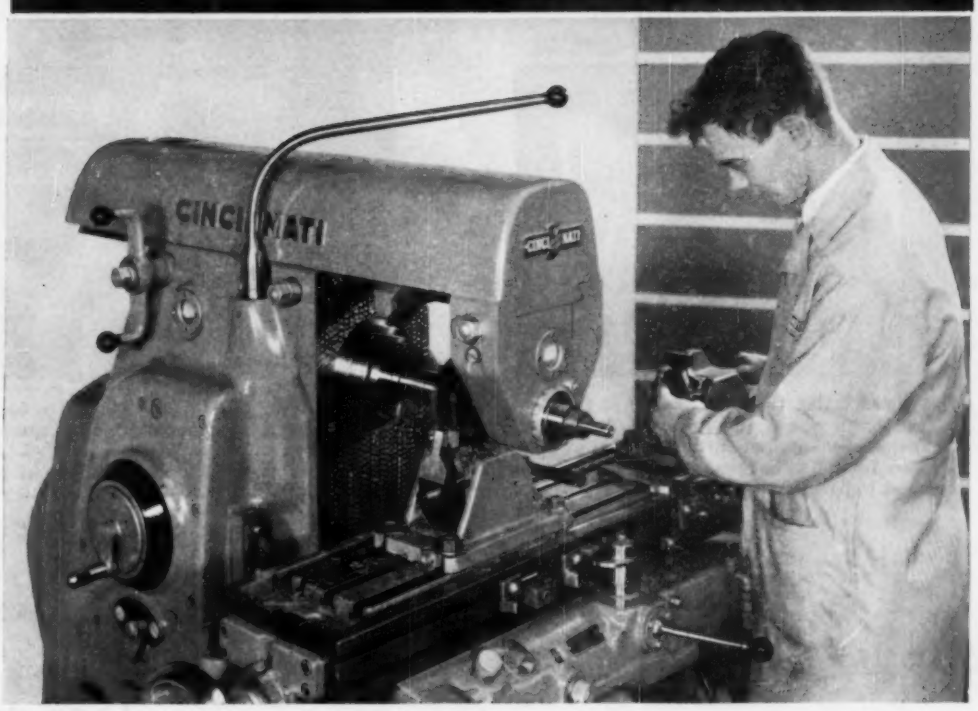
**And for large quantity production,** Cincinnati gives you the following additional advantages . . . automatic table cycles; 150 ipm rapid traverse; automatic backlash eliminator.

The foregoing features are standard; they're common to the three lines shown in the spec table. Get more information by looking in Sweet's Machine Tool File, or ask for the catalogs mentioned below.

| | | |
|---|---|---|
| ML and MI Group | 3 to 7½ hp main drive | Catalog No. M-1995 |
| Dial Type Group | 10 to 20 hp main drive | Catalog No. M-1915-2 |
| High Power and Dual Power Dial Type Group | 15 to 50 hp main drive | Catalog No. M-1917-3 |

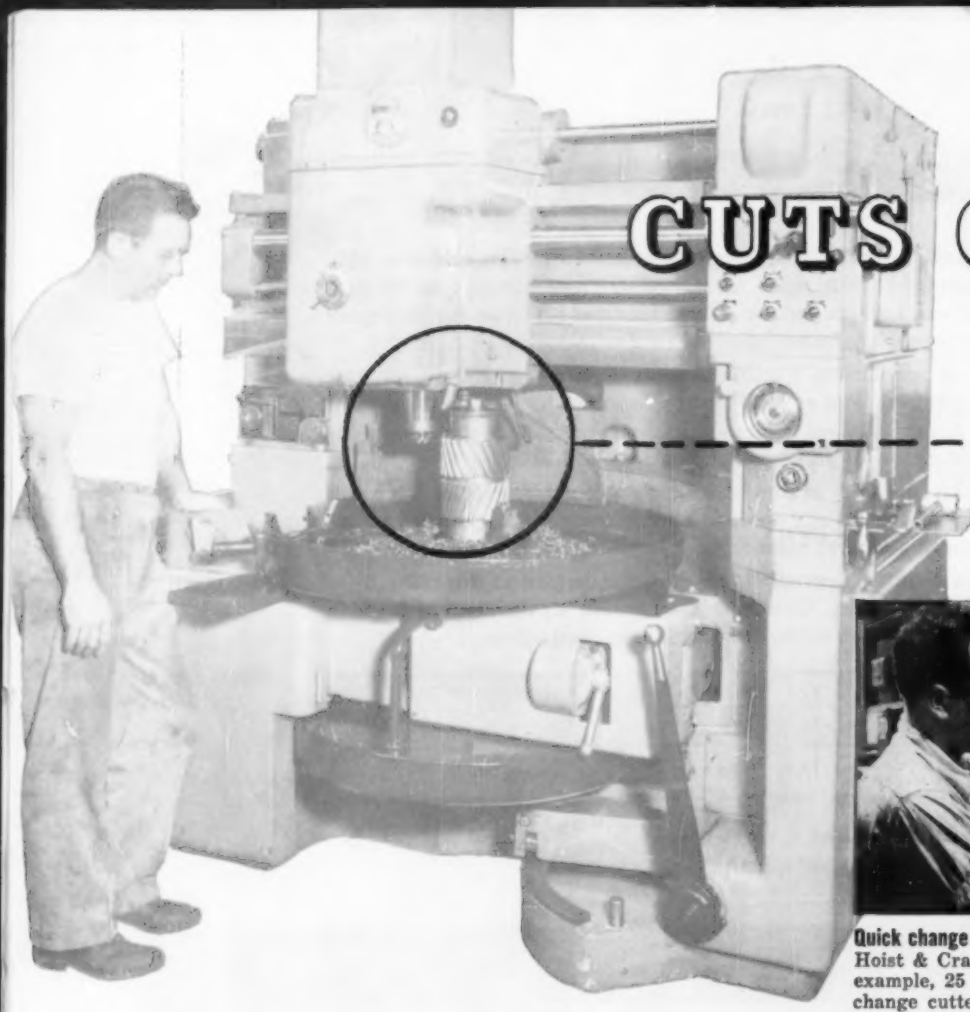
**THE CINCINNATI MILLING MACHINE CO.**
**CINCINNATI 9, OHIO**

**LOT SIZE . . . *hundreds***

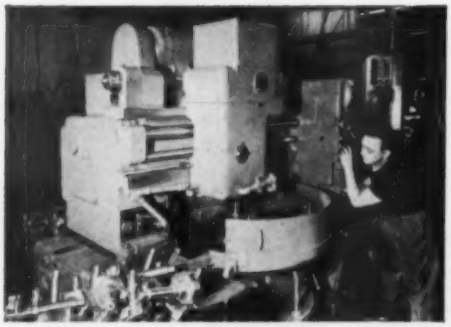



**TOOLS • METAL FORMING MACHINES • HARDENING MACHINES • CUTTING FLUID • GRINDING WHEELS**

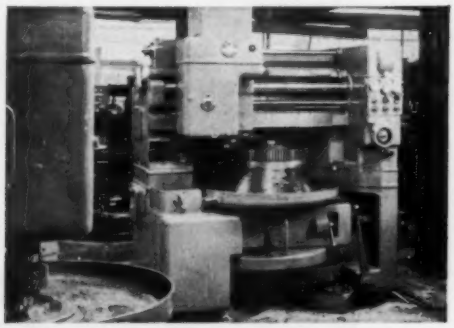
# CUTS COSTS



**Quick change** cuts costs on short runs: at Silent Hoist & Crane Company, Brooklyn, N. Y., for example, 25 seconds is all the time needed to change cutter speed, depth of cut and rotary feed for different sized sprockets.



**Five times faster** than the machines they replaced on a variety of jobs, 36-Type Gear Shapers set many cost-cutting records at New Process Gear Co., Syracuse, N. Y. Part shown cut in one operation. Rate: 135 finished per day.

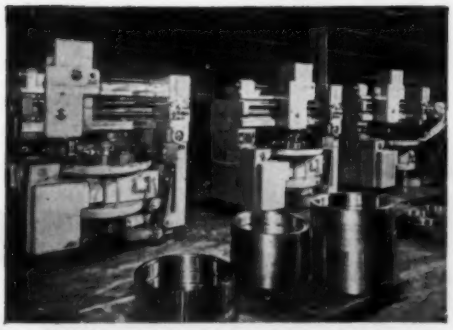


**Faster on gears up to 36" P.D.**, two 36-Type machines replaced *five* older machines at Samuel M. Langston Co., Camden, N. J. 22.250" P.D., 4 D.P. steel spur shown is cut in 2½ hours. Production time on previous machine—10 hours.

THE PRECISION LINE

# 5 WAYS

## FELLOWS 36-TYPE GEAR SHAPER



**Heavy cutting power:** 36-Type Gear Shaper removes 93 cubic inches of stock (26 lbs.) from the blank in just two cuts to make this 25.3" P.D., 3 D.P. gear at Fairfield Manufacturing Co., Lafayette, Ind. Total time: 258 minutes.

**More efficient small gear cutting, too:** 57 minutes is all it takes to cut each hand of this 6.486" P.D., 5/7 D.P.; 23° H.A., herringbone pinion at Snow-Nabstedt Corporation, Hamden, Conn., on their 36-Type Gear Shapers.

Here's the way to lower gear production costs even though over-all costs keep rising! These major firms (and many others) have proved that fast, accurate Fellows 36-Type Gear Shapers have the power, speed and versatility to cut production costs . . . often by more than 50%!

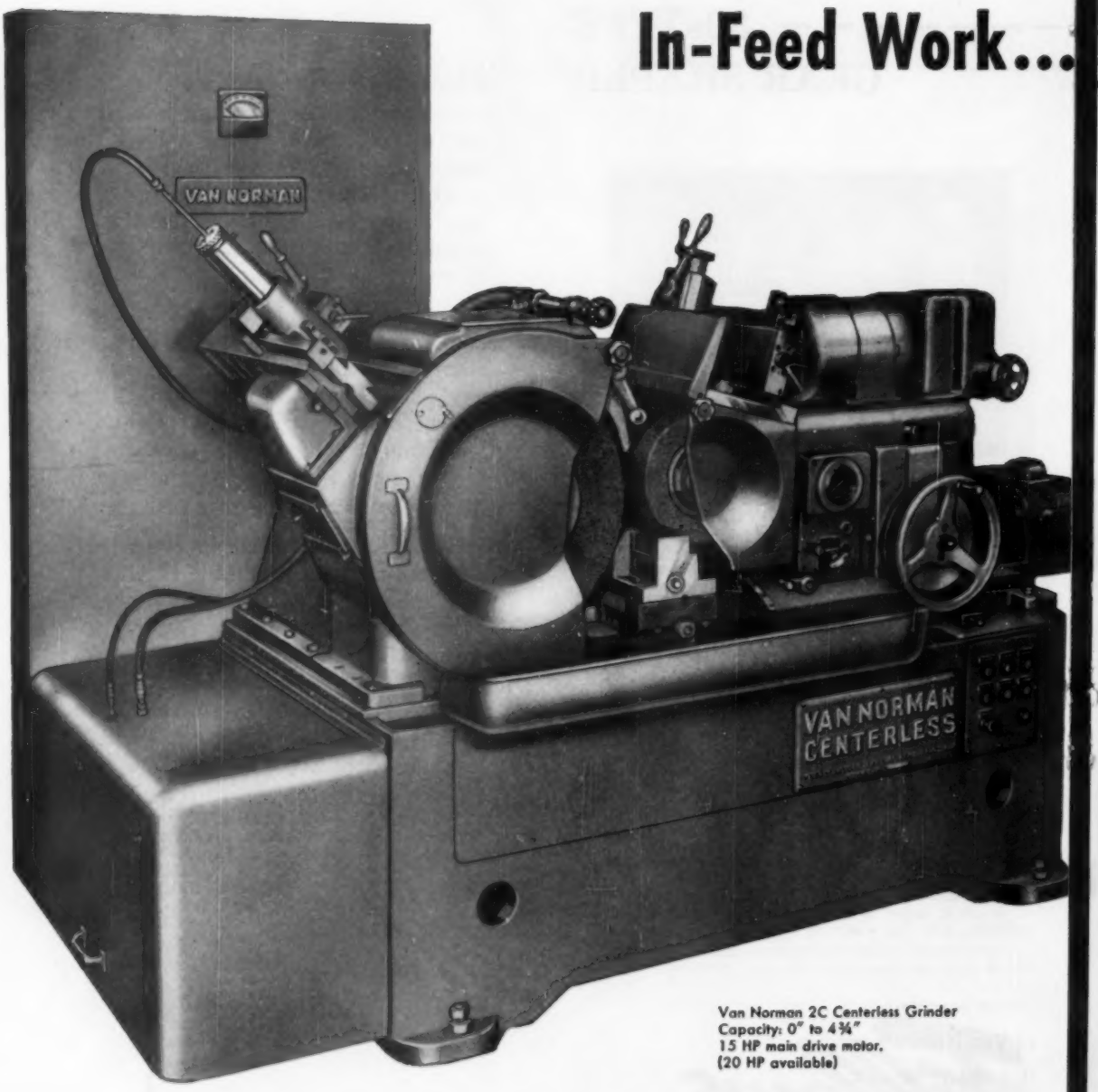
Set-ups are fast and simple for a wide range of jobs up to 36" P.D. Cutter speeds from 18 to 300 strokes per minute are available through a selector dial. Four rotary feeds are available through a feed lever, additional feeds through two pick-off gears. Semi-automatic fixtures may be used to decrease loading time.

Whether for long runs or many varied jobs, the powerful, versatile Fellows 36-Type Gear Shaper can very probably lower *your* gear production costs. Your Fellows Representative can give you valuable facts and figures about the benefits of investing in the Fellows Precision Line of gear production equipment. Write, wire, or phone any Fellows office.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 1048 N. Woodward Ave., Royal Oak, Mich.
150 West Pleasant Avenue, Maywood, N. J.
5835 West North Avenue, Chicago 39
6214 West Manchester Avenue, Los Angeles 45

*Fellows* *Gear Production Equipment*

# Now you can do: Thru-Feed Work...
# In-Feed Work...




Van Norman 2C Centerless Grinder
Capacity: 0" to 4¾"
15 HP main drive motor.
(20 HP available)

# VAN NORMAN MACHINE

**MANUFACTURERS OF — Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.**

# ...Form Grinding...Profile Work...

# with ONE

# VAN NORMAN 2C
## Centerless Grinder

Featuring a 15 HP main drive motor which provides ample power for every grinding job, the Van Norman 2C Centerless Grinder actually gives you the facilities of *3* centerless grinders . . . standard grinding for thru-feed work . . . standard grinding for in-feed jobs and, equipped with crush dressing attachment, form grinding and profile work.

Get complete details on this newest in the expanding line of Van Norman grinders. Write, wire or telephone today for descriptive catalogs.

**Check these features of the Van Norman 2C Centerless Grinder:**

- √ Hard chrome plating of regulating wheel slide preserves original factory built-in accuracy.
- √ Grinding wheel and regulating wheel spindles are of a unit type construction . . . totally enclosed with double-row super-precision bearings, sealed and lubricated for life — assuring rigidity and accuracy previously unobtainable in centerless grinding, vibrationless operation.
- √ Spindles require no warm-up period, eliminating "creep."
- √ Infinitely variable regulating wheel drive.
- √ Combination straight and profile hydraulic wheel dressers for each wheel.
- √ **Crush dressing attachment**

**COMPANY**
**SPRINGFIELD 7, MASSACHUSETTS**

Don't wait . . . for extra profit install a Van Norman machine now! They are available in many purchase plans . . . Outright sale . . . Purchase on conditional sales contract up to five years . . . Pay as you depreciate . . . up to 10 years.

# One Machine Bolt Threaded

## WITH THE LANDIS FOUR-THREADING MACHINE

LANDIS Machine COMPANY

THE WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF THREAD GENERATING EQUIPMENT

# Every 4⅓ Seconds ! ! ! !

## SPINDLE SEMI-AUTOMATIC

A single operator at the Pittsburgh Screw and Bolt Corporation produces an average output of 840 machine bolts per hour.

This operation requires the threading of 1″ Square Head Machine Bolts from Commercial Steel blanks of 217/163 Brinnel hardness. 1″ 8 pitch USS threads are cut 2¾″ long at a cutting speed of 44 surface feet per minute. Production is continuous and chaser cost is extremely low.

The use of the *LANDIS* Four-Spindle Machine allows the operator to surpass the output of four independent threading spindles. Operation is semi-automatic—the operator inserts the workpiece in the grips, which open and close automatically, and removes it when threading is complete. The die head automatically feeds onto the workpiece, opens automatically and is automatically withdrawn at the point when the desired thread length is completed.

Send specifications when writing for Bulletin #E-88-1

**WAYNESBORO PENNSYLVANIA**

# Save on first cost: One compact grinder multi-purpose versatility

*Landis 12" x 28" Universal and Tool Grinder 22 optional accessories extend range of grinding operations*

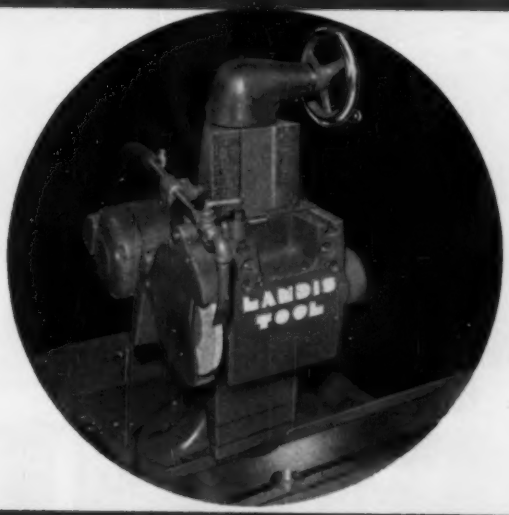
**LANDIS**
precision grinders

LANDIS TOOL COMPANY
WAYNESBORO, PENNSYLVANIA

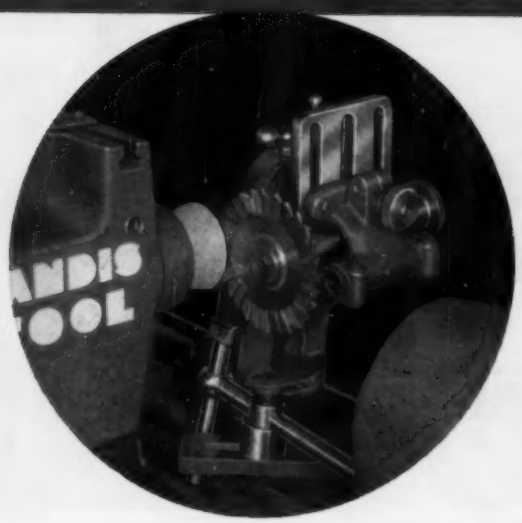
# for toolroom precision and

**features that assure fast setups, precision results**

**Continuously variable speed** headstock drive permits adjustment for the best work speed without shifting belts. Only two revolving parts.

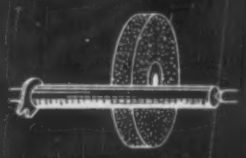



**Rigid wheel head mounting** on massive column adds stability for accuracy and fine finishes. Vertical ways for wheel height movement protected by telescoping covers below wheel head.

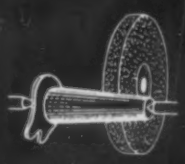



**Tool sharpening . . .** a wide variety of tools and cutters can be sharpened with standard and extra equipment.

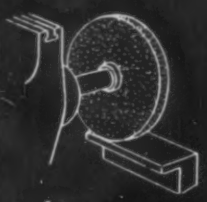
**grinding operations with standard equipment**



cylindrical

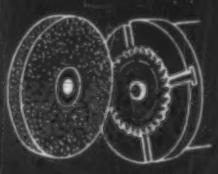


taper



surface

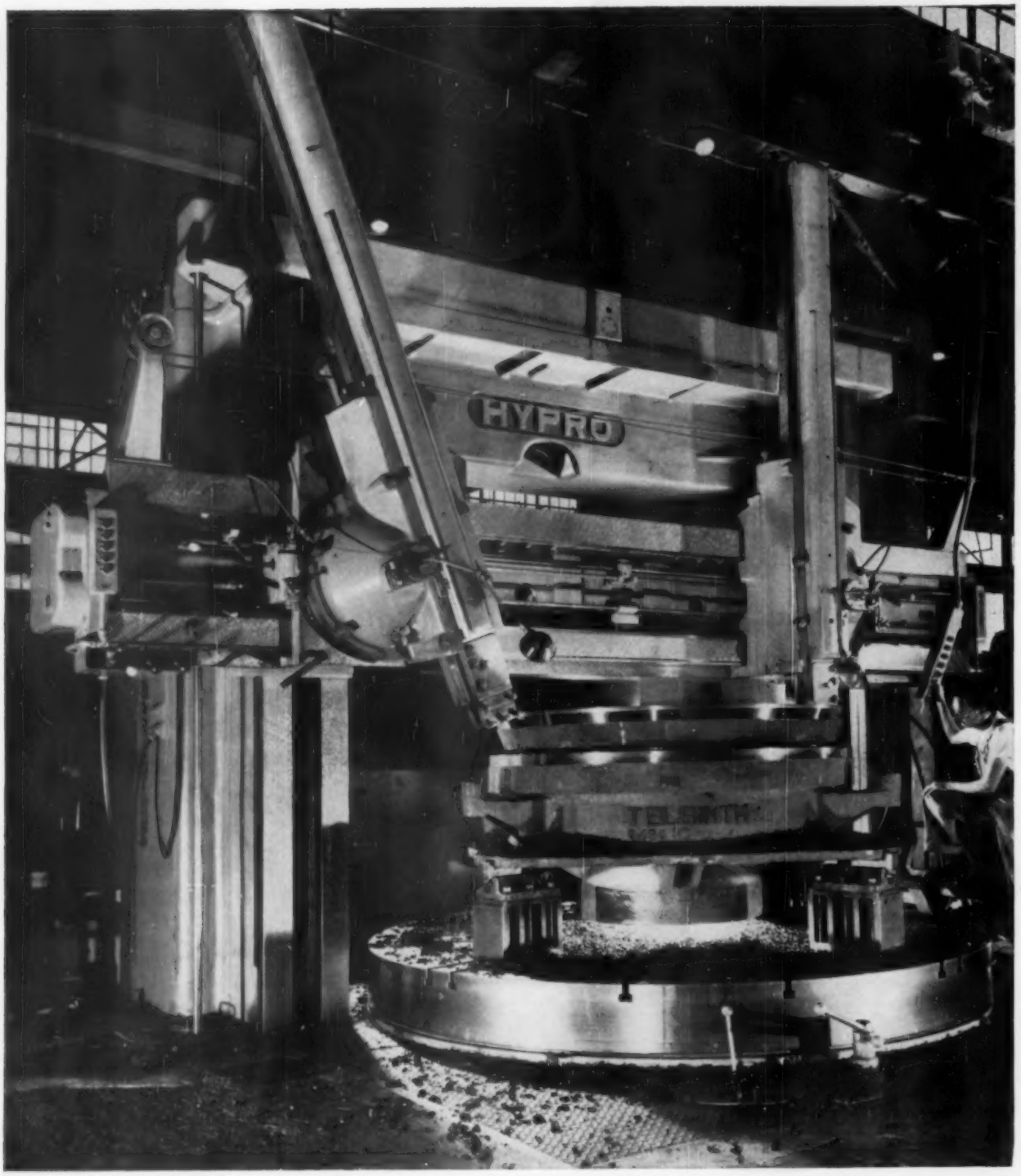
tooth sharpening



face

spiral mill

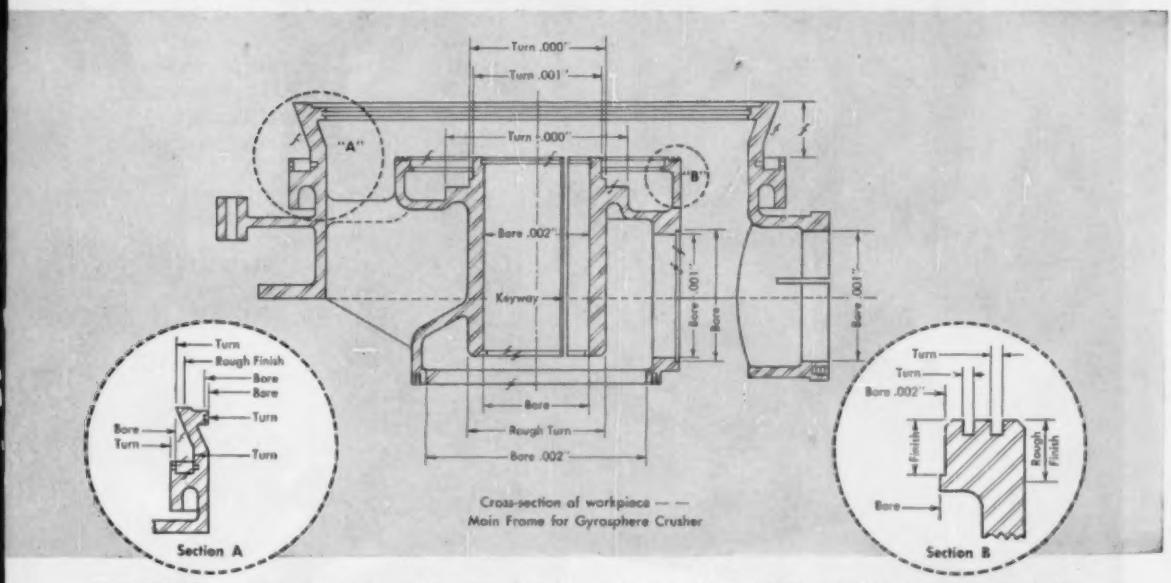
# 20 precision turning



# and boring operations

## .000" to -.002" tolerances

**That's what Smith Engineering gets with a Giddings & Lewis 10-ft. Hypro Vertical Mill, machining 5½-ton, all-steel Gyrasphere main crusher frames**




HERE'S another Giddings & Lewis' masterpiece of precision in action. It's a 10-ft. Hypro Vertical Boring and Turning mill that's on the job every day at the Smith Engineering Works, Milwaukee. Extremely versatile and accurate, this boring mill turns and bores 20 different diameters on the hi-carbon, cast-steel main crusher frame — 7-ft. wide, 3'4½" high, weighing 5½ tons. Inside and outside diameters at different height are machined to precise tolerances — .000" to −.002".

There's a good reason for this kind of precision performance. You'll find it in G&L's advanced design and operating features, such as non-metallic ram and saddle bearings that resist abrasive action of metal dust and forging scale, residual heat, etc. No more chatter, cutter breakage and vibration so harmful to precision machining.

G&L Hypro Vertical Boring and Turning mills are available with an electronic tracer control system, plus a wide range of optional operating features. They're built in 12 standard models with capacities ranging from 54" to 12'.

Remember, if you're considering buying a new vertical boring mill, it will be profitable for you to get in touch with your G&L representative today, or write direct to factory.

**Write for this 42-page catalog, describing and illustrating G&L's broad line of Hypro Vertical mills. Ask for Catalog No. 54-12.**

**G & L *and* HYPRO DIVISION**
**GIDDINGS & LEWIS MACHINE TOOL CO.**
FOND DU LAC, WISCONSIN

G-62

*Builders of the world's finest heavy-duty Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; HYPRO Double Housing and Openside Planers; Planer-Type Milling Machines; Vertical Boring Mills; Spar and Shin Milling Machines, and VARIAX Machines.*

# THE HIGHEST

. . . is ground on

Spiral bevel gear, being ground on the sleeve diameter, is typical of the high-quality work assigned to CINCINNATI FILMATIC Plain Hydraulic Grinding Machines.

Large diameter sleeve gears and other expensive parts are precision ground with confidence on a Cincinnati.

CINCINNATI

# CINCIN

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • ROLL GRINDING MACHINES • SURFACE

# QUALITY WORK

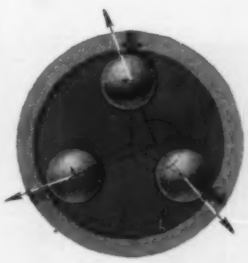
## CINCINNATI Filmatic Plain Hydraulic Grinders

The craftsman's skill in producing extra high-quality work is incorporated in CINCINNATI® FILMATIC Plain Hydraulic Grinding Machines. That's why comparatively inexperienced operators can do an excellent job. ¶Exclusive features such as FILMATIC grinding wheel spindle bearings and automatic grinding wheel balancing, illustrated here, are two important segments of "built-in skill." Others include anti-backlash device on the infeed screw . . . automatic pickfeed infinitely variable from .0001" to .0025" . . . single lever control. Extra equipment available for production work includes automatic air-electric gage sizing . . . push-button automatic dual rate infeed . . . 37 additional items. May we tell you more about CINCINNATI FILMATIC Plain Hydraulic Grinding Machines? Ask for catalogs listed in the spec table, or look in Sweet's Machine Tool File for brief data.

**CINCINNATI GRINDERS INCORPORATED**
**CINCINNATI 9, OHIO**

FILMATIC

**FILMATIC grinding wheel spindle bearings, an exclusive feature, run for years without requiring maintenance or adjustment.**



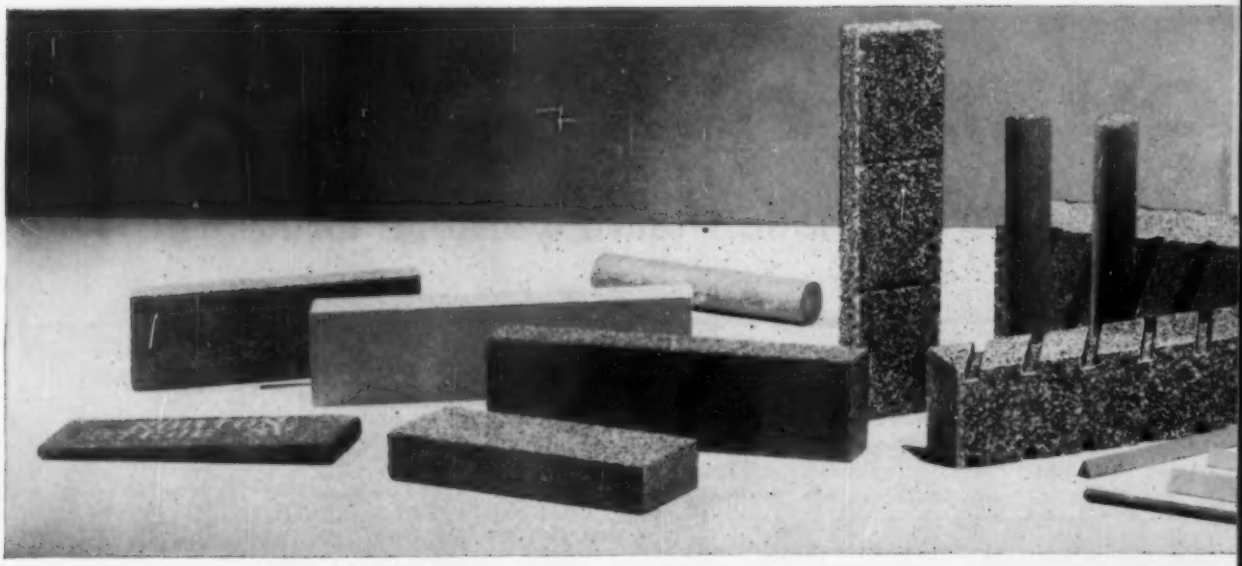
**Freely rotating steel balls automatically balance the wheel mount assembly when unclamped. Perfect balance is attained in a few seconds.**

**CINCINNATI FILMATIC 6"R Plain Hydraulic Grinding Machine.** There are four sizes in this line of fine precision grinding equipment:

| Size | Between-Center Lengths | Catalog |
|---|---|---|
| 6"R, 10"L | 18" and 30" | G-660-2 |
| 10"R, 14"L | 18", 36", 48", 72" and 96" | G-661-1 |

# NATI

**GRINDING MACHINES • CHUCKING GRINDERS • MICRO-CENTRIC GRINDING MACHINES • CENTERLESS LAPPING MACHINES**



# Handy, money-saving "First Aids"

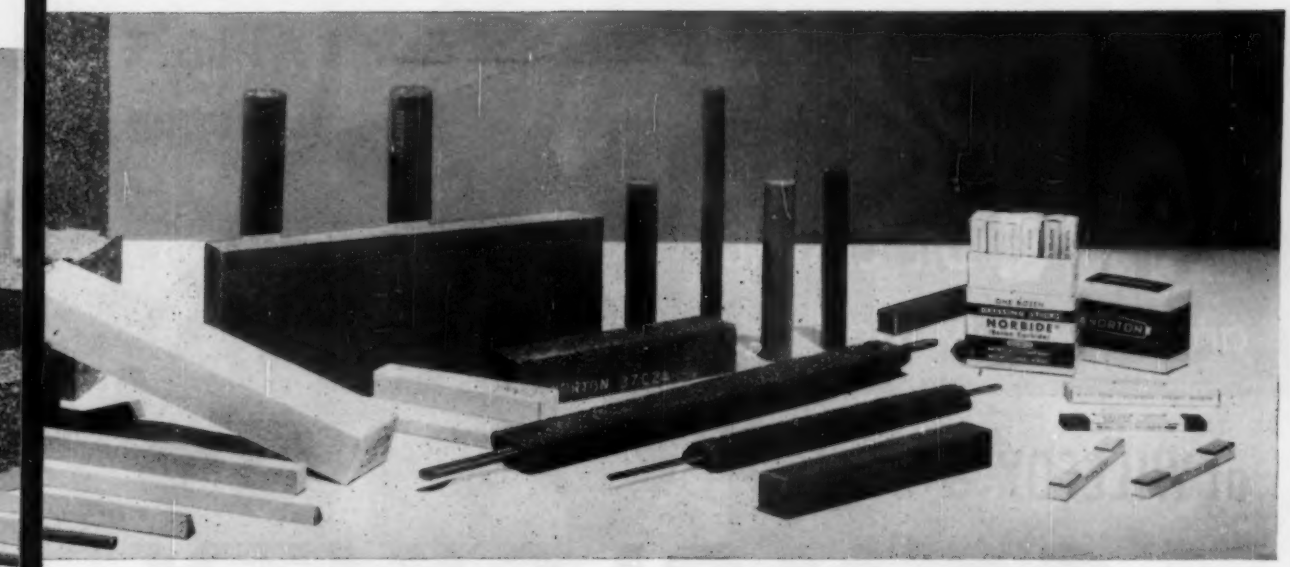
**For many wheels a CRYSTOLON® dressing stick** does an excellent job in maintaining a uniform cutting surface. With each different type of the famous Norton diamond wheels, for example, a CRYSTOLON stick is supplied in the right degree of hardness for best results in dressing. ALUNDUM® sticks are excellent for smoothing die areas, and Norton BF sticks of ALUNDUM abrasive, reinforced with cotton fiber, are often preferred for breaking edges, hand finishing molds and other small parts.

**A NORBIDE® dressing stick takes no time,** practically, to touch up a cup or saucer wheel, clean up a wheel face, or form a radius or groove. Just a couple of passes is all you need, in fact, because this outstanding Norton development is next to diamonds in hardness, costs only a fraction of diamonds, and outlasts hundreds of ordinary sticks.

**Hardest of all is the Norton diamond hone.** Here a vitrified diamond hone is working on the side cutting edge and nose radius of a carbide tipped tool. Honing lightly at a 45° angle is worthwhile protection when the carbide is used for making heavy cuts in steel, since steel scale and chips may cause an extremely sharp edge to flake off.

**Cleaning up castings with a CRYSTOLON brick** is a quick and handy way to remove sand, scale and parting lines. Bricks of this fast-cutting abrasive are made in a wide range of sizes and shapes, plain surfaced or slotted. They're also highly valuable in a variety of plant maintenance operations, such as smoothing off concrete foundations, walls, or other masonry jobs.

**Core files are useful for shaping and smoothing sand cores** for hollow castings. Like the Norton bricks they're made of CRYSTOLON abrasive, which gives them the same fast cutting action. And because of their long, slender shapes they're reinforced with metal rods, for added strength and ease of handling.

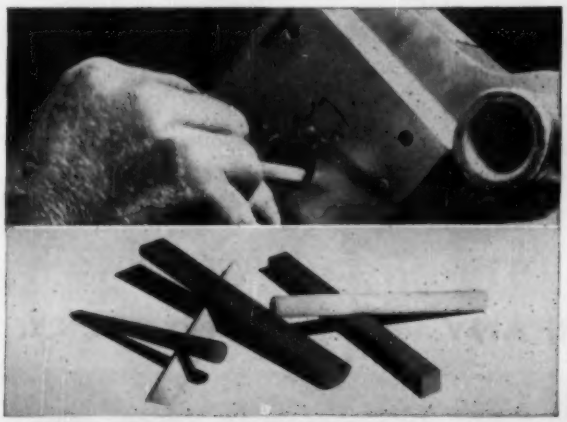



# for plenty of plant jobs

## *Norton bricks, sticks, hones, core files, keep many of your tools, products and equipment in top condition*

With Norton bricks, sticks and other hand-operated smoothing implements, you can simplify many everyday plant jobs. You can cut time and expense, too, because you eliminate adjusting or running any machines. Ask your Norton Distributor about all the advantages. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors all around the world.

W-1826



**Behr-Manning Division files** are noted for fast, smooth stoning and honing of dies, as well as sharpening. The round file shown in action is an INDIA oilstone. In the smaller photo, Behr-Manning oilstone files for many other industrial uses include INDIA point, half-point and square shapes, and ARKANSAS triangle and round shapes.

NORTON

ABRASIVES

*Making better products... to make your products better*

**NORTON PRODUCTS**
Abrasives • Grinding Wheels • Grinding Machines • Refractories
**BEHR-MANNING DIVISION**
Coated Abrasives • Sharpening Stones • Behr-cat Tapes

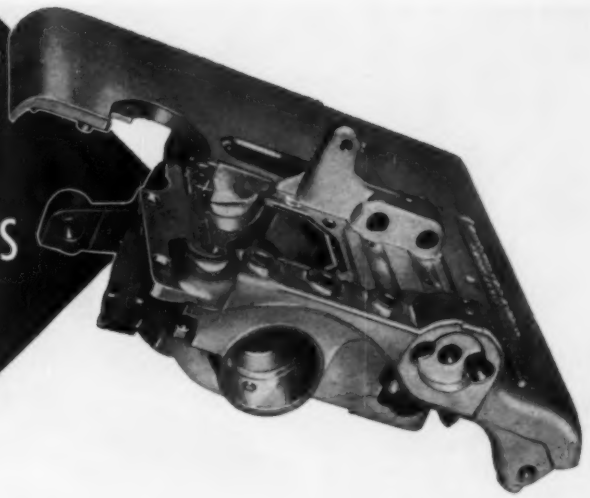
*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

There's a Good Reason

WHY

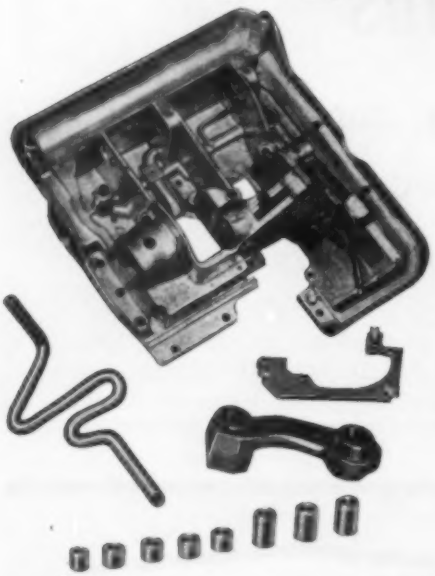
ZINC DIE CASTINGS

are so widely used –



at WILLCOX & GIBBS

it's COMPLEXITY



With eight knurled and threaded steel bushings, a steel bracket, a large, double, bearing frame, and a copper tube cast into the top frame as inserts, this is probably one of the most complicated ZINC Die Castings ever to come out of a die caster's shop. The result is COMPLEXITY with a purpose, and ZINC Die Casting takes complexity for granted.

This unbelievable complexity of shape was readily achieved in this sewing machine top frame through a single ZINC Die Casting. Willcox & Gibbs engineers incorporated features which would support dozens of critical parts to operate a mechanism moving at 5,500 rpm with incredibly fast starts and stops—and without vibration.

This rugged commercial sewing machine has to meet high performance demands for seaming, hemming, edging and serging operations at lightning-fast speeds—day-in, day-out utility—for fifteen years and more. Only ZINC Die Casting could provide these exacting requirements.

All sides of this top frame have numerous cored openings (the cores being pulled in four directions) that simplify assembly and help to make the "Superlock" sewing machine so efficient. There are many advantages in this ZINC Die Casting that may provide answers to some of your production problems. Send for our free folder "Zinc Die Castings" and then see a commercial die caster.

**THE NEW JERSEY ZINC COMPANY** 160 Front Street, New York 38, N. Y.

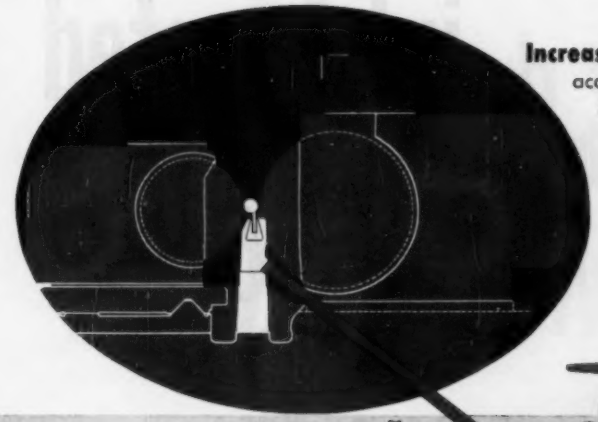
The research was done and the Zamak die casting alloys were developed with

HORSE HEAD SPECIAL (99.99 + % Uniform Quality)

ZINC

FOR DIE CASTING ALLOYS

# Exclusive Landis feature increases centerless production... permits heavier cuts without loss of finish or accuracy



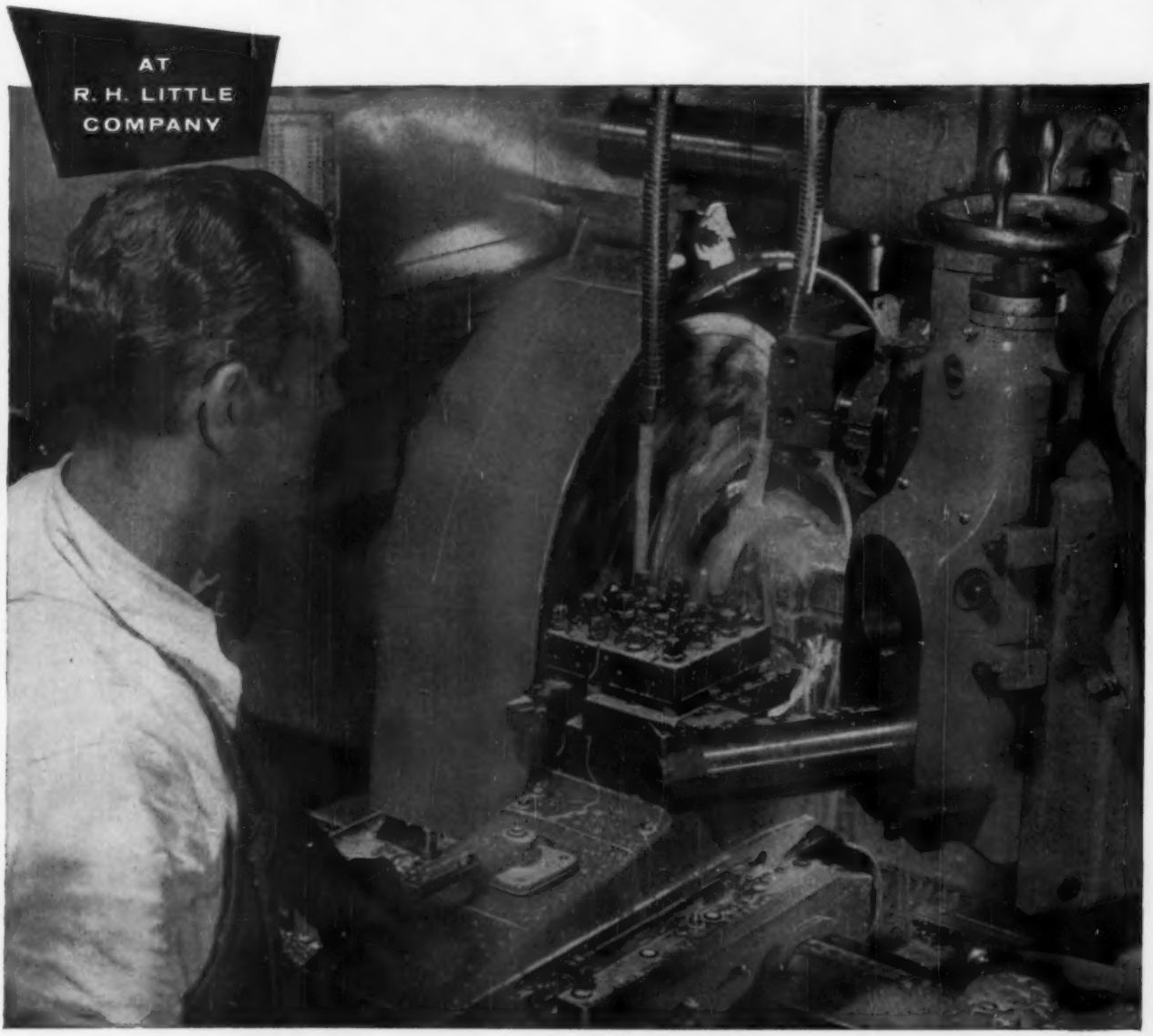
**Increased production** with better finish and accuracy because the stationary work rest is anchored solidly to heavy, rigid bed.

Landis No. 12
Centerless Grinder

| condensed specifications | model #12 | model #12½ |
|---|---|---|
| Work capacity (diameter) | 1/16"-3½" | ½"-3½" |
| Standard Wheel Widths | 4", 6", 8" | 4", 6", 8", 10" |
| Wheel Drive Motors | 15 hp. Max. | 25 hp. Max. |

**LANDIS**
precision grinders
LANDIS TOOL COMPANY / WAYNESBORO, PENNA.

# Power and rigidity of Warner & interrupted —BOOST



# Swasey 4-A easily handle severe cuts in tough steel casting

# *PRODUCTION 200%!*

**Once again, the cost-cutting combination of power, rigidity and accuracy built into all Warner & Swaseys has more than doubled production—this time up to 200% for the R. H. Little Company of Canton, Ohio.**

ENCLOSURES OF SAE 1045 cast steel for diesel-electric locomotive journals, designed by The Timken Roller Bearing Company, are run in 500-piece lots at the rate of 12 to 15 daily on Little's new Warner & Swasey 4-A Extra-Heavy Duty Saddle Type Turret Lathe.

The part has ⅛ to ⅜-inch stock per side. In addition to heavy stock removal, severely-interrupted cuts put a terrific strain on both tooling and the machine. Power and rigidity of the 4-A easily handle the job. On the first operation involving combined and multiple cuts—four in all—metal removal is equivalent to 1½ inches. Three cuts—two turning and one boring—are taken from the hexagon turret combined with a facing cut from the square turret. Carbide tooling roughs the part at 250 SFM—.017 inch feed; finishing operations are at 400 SFM.

This same casting was previously machined at the rate of only 5 a day when run on a 20-year-old lathe. Production was held down due to the machine's lack of horsepower and rigidity. This caused excessive downtime for tool changing and required constant operator attention to the maintenance of longitudinal and diametrical tolerances.

When you require extreme machining accuracy, with heavy metal removal, call the Warner & Swasey Field Representative. He will discuss with you how the job can be handled most efficiently.

**YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS ... WITH A WARNER & SWASEY**

WARNER & SWASEY
*Cleveland*
PRECISION MACHINERY SINCE 1880

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Whether you need one item — or up to fifty packages — you'll profit in many ways when you do business with your Authorized Distributor of Carboloy cemented carbides.

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The name of your local Authorized Carboloy Distributor is listed above — and his phone number is in the Yellow Pages of your telephone directory. Call him today . . . and get acquainted with the many services only he can offer. *Metallurgical Products Department of General Electric Company, 11149 E. 8 Mile Blvd., Detroit 32, Michigan.*

CARBOLOY®
CEMENTED CARBIDES
GENERAL ELECTRIC

## 20,000,000 gun barrels is a heck of a lot of experience!

Gun barrels and rifle barrels

LAPOINTE -BROACH-RIFLED

to close tolerances . . . and with less than 1% rejects!

**Lapointe developed broach-rifling** of gun barrels many years ago. Previously, rejects from rifling on conventional rifling machines had been extremely high — so Lapointe accepted the challenge to perform the rifling operation by broaching.

**The success of Lapointe Broach-Rifling** has long been known. Machining time was cut on a 20mm. barrel from 4½ hours to *three minutes* . . . on a 37mm. barrel from 6 hours to *five minutes.* During World War II, over 20,000,000 barrels were rifled on Lapointe broaching machines such as shown here . . . and equipped with Lapointe broaches.

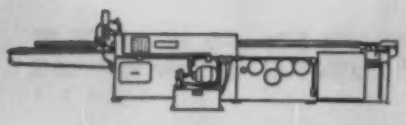
**If you are planning to do this operation,** you should obtain the Lapointe Bulletin HP-1, which fully describes our series of broach-rifling machines, *all of which produce finished barrels that require no reaming.*

**THE LAPOINTE MACHINE TOOL COMPANY**

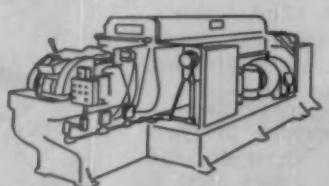
HUDSON, MASSACHUSETTS • U.S.A. *In England: Watford, Hertfordshire*

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

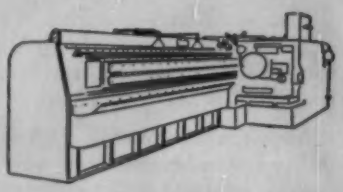
***Here's a line of ELECTRO-MOTIVE DRIVE BROACHING MACHINES . . . . . available only at LAPOINTE***



60" STROKE HORIZONTAL, ELECTRIC

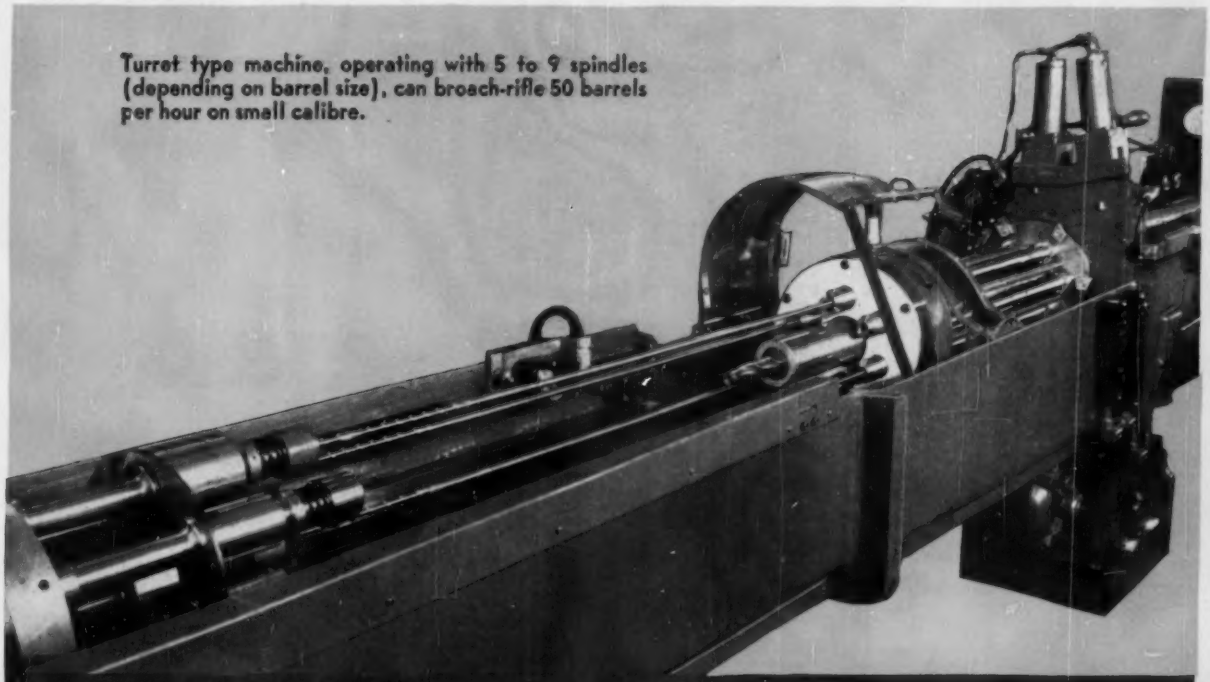


CH CONTINUOUS BROACHING, ELECTRIC

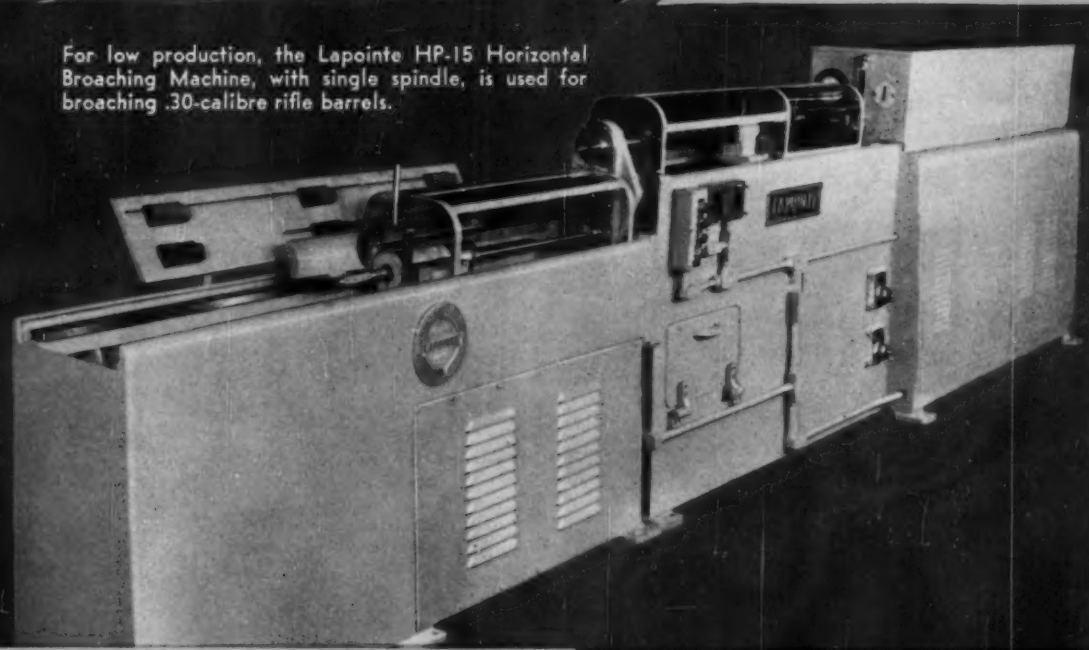


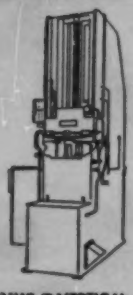
SRHE SINGLE RAM HORIZONTAL, ELECTRIC

Turret type machine, operating with 5 to 9 spindles (depending on barrel size), can broach-rifle 50 barrels per hour on small calibre.

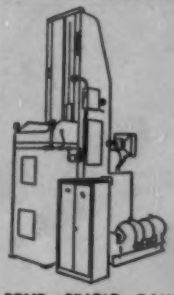


For low production, the Lapointe HP-15 Horizontal Broaching Machine, with single spindle, is used for broaching .30-calibre rifle barrels.





VUE-7 VERTICAL PULL-UP ELECTRIC



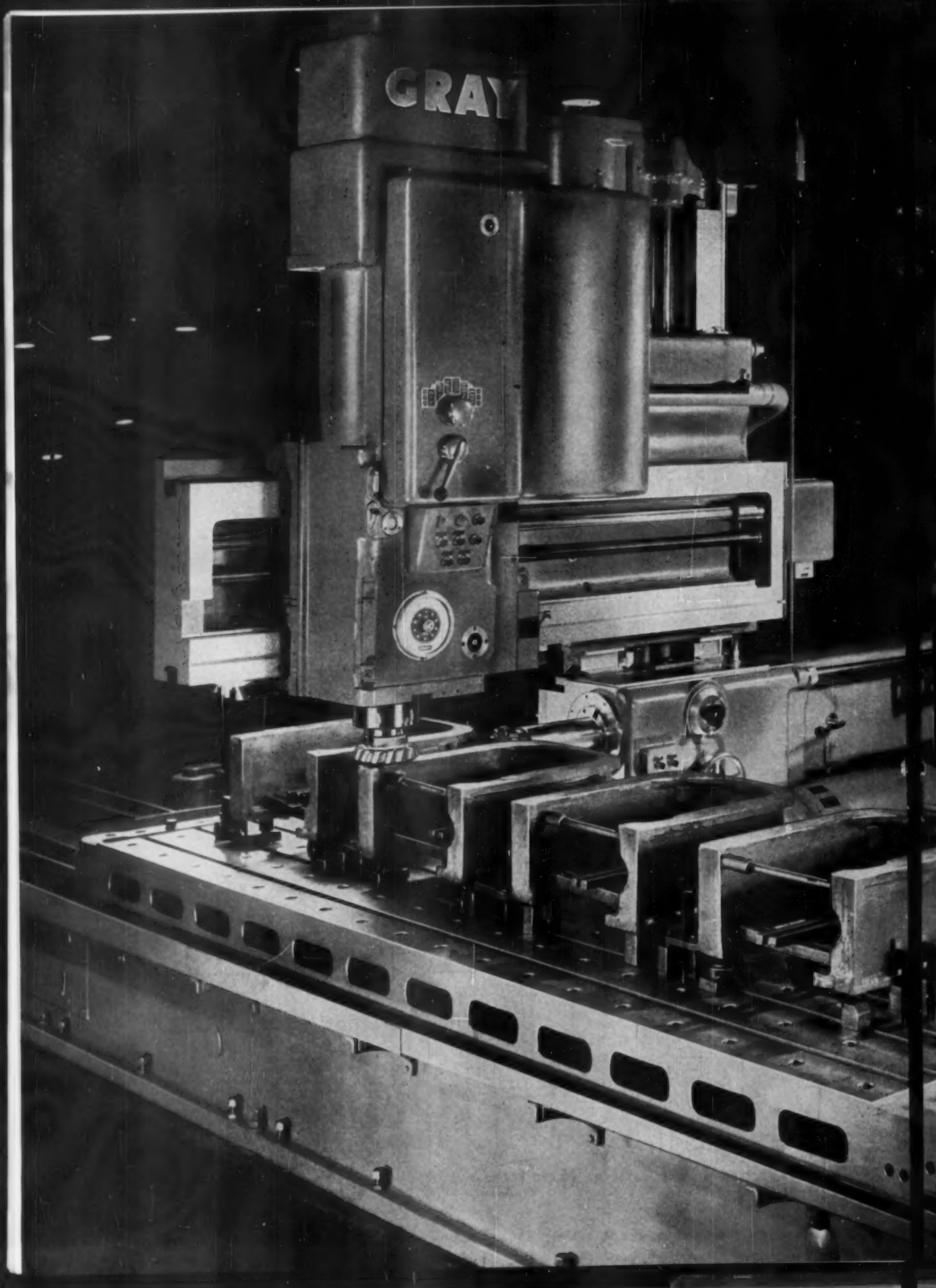
SRVE SINGLE RAM VERTICAL, ELECTRIC

DRVE DOUBLE RAM VERTICAL, ELECTRIC

**LAPOINTE**

known to be the best in

**BROACHING**


GRAY

If you're tired of seeing small jobs on your large expensive millers . . .

If you're tired of extra set-ups because your miller has only a single head . . .

If you're tired of whittling away at rugged jobs with low power heads . . .

If you're tired of complicated controls that make your operator a mountain goat . . .

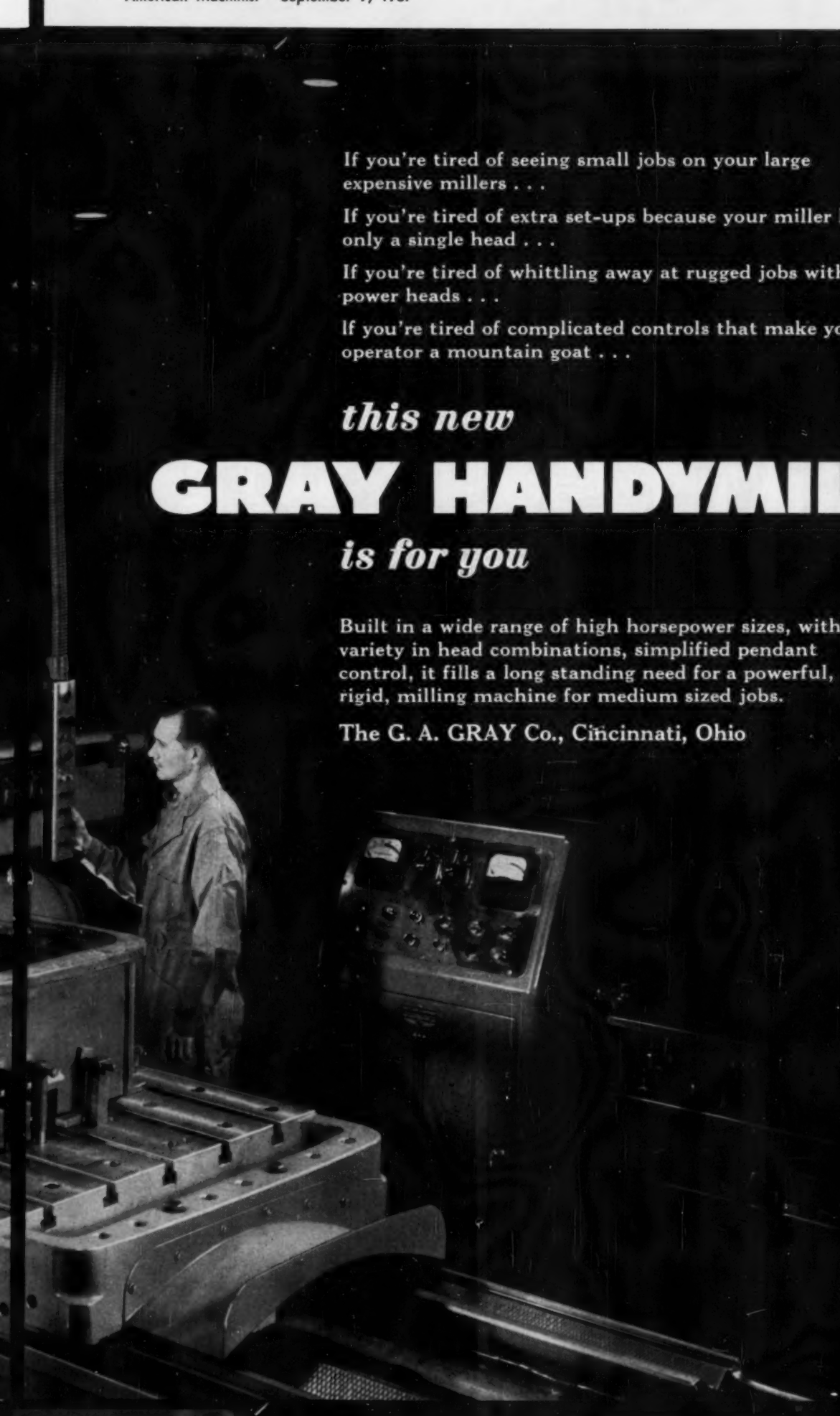
*this new*

# GRAY HANDYMILL

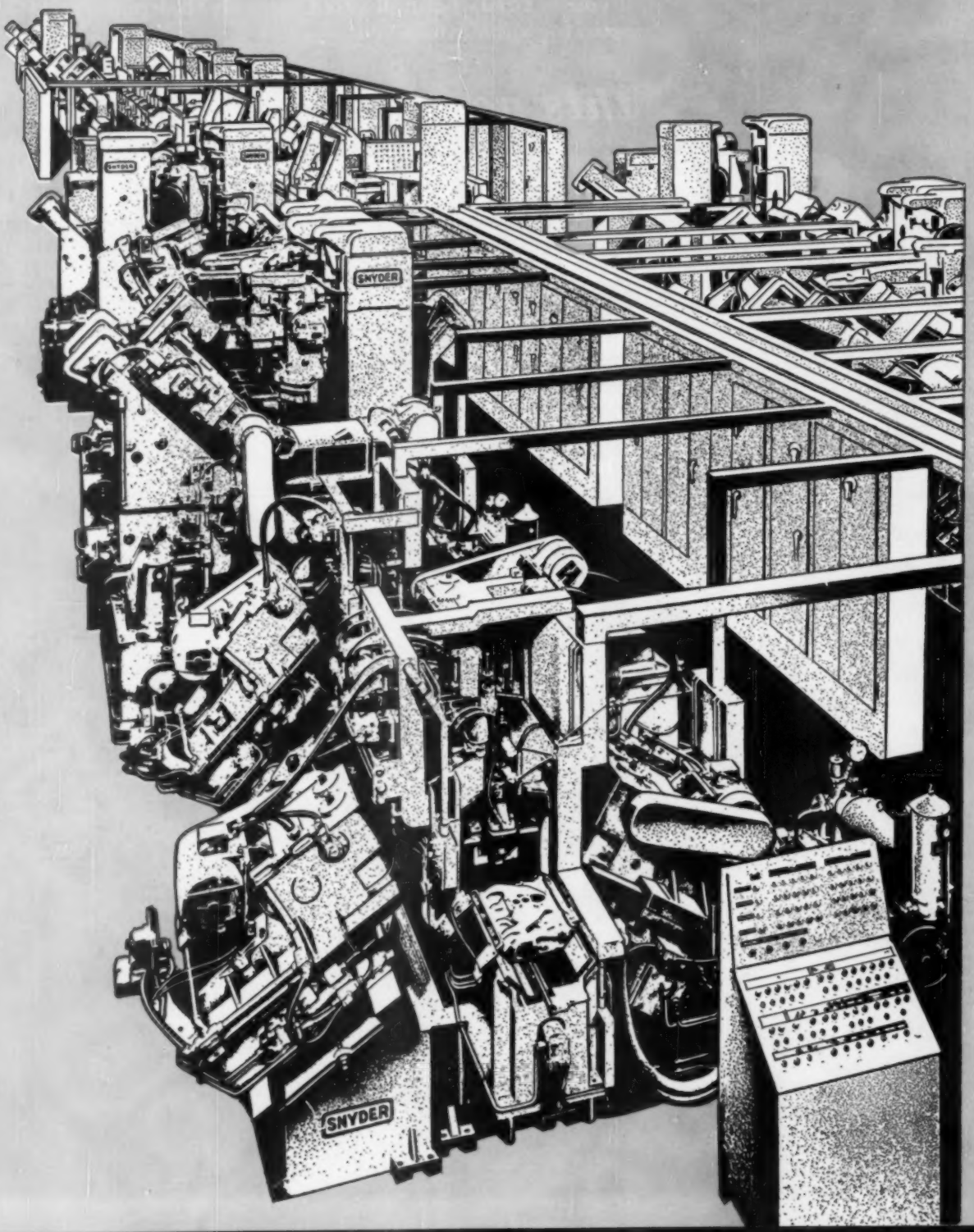
*is for you*

Built in a wide range of high horsepower sizes, with great variety in head combinations, simplified pendant control, it fills a long standing need for a powerful, rigid, milling machine for medium sized jobs.

The G. A. GRAY Co., Cincinnati, Ohio



# Unique Combination of Snyder Special Two or Four Barrel Intake Manifold

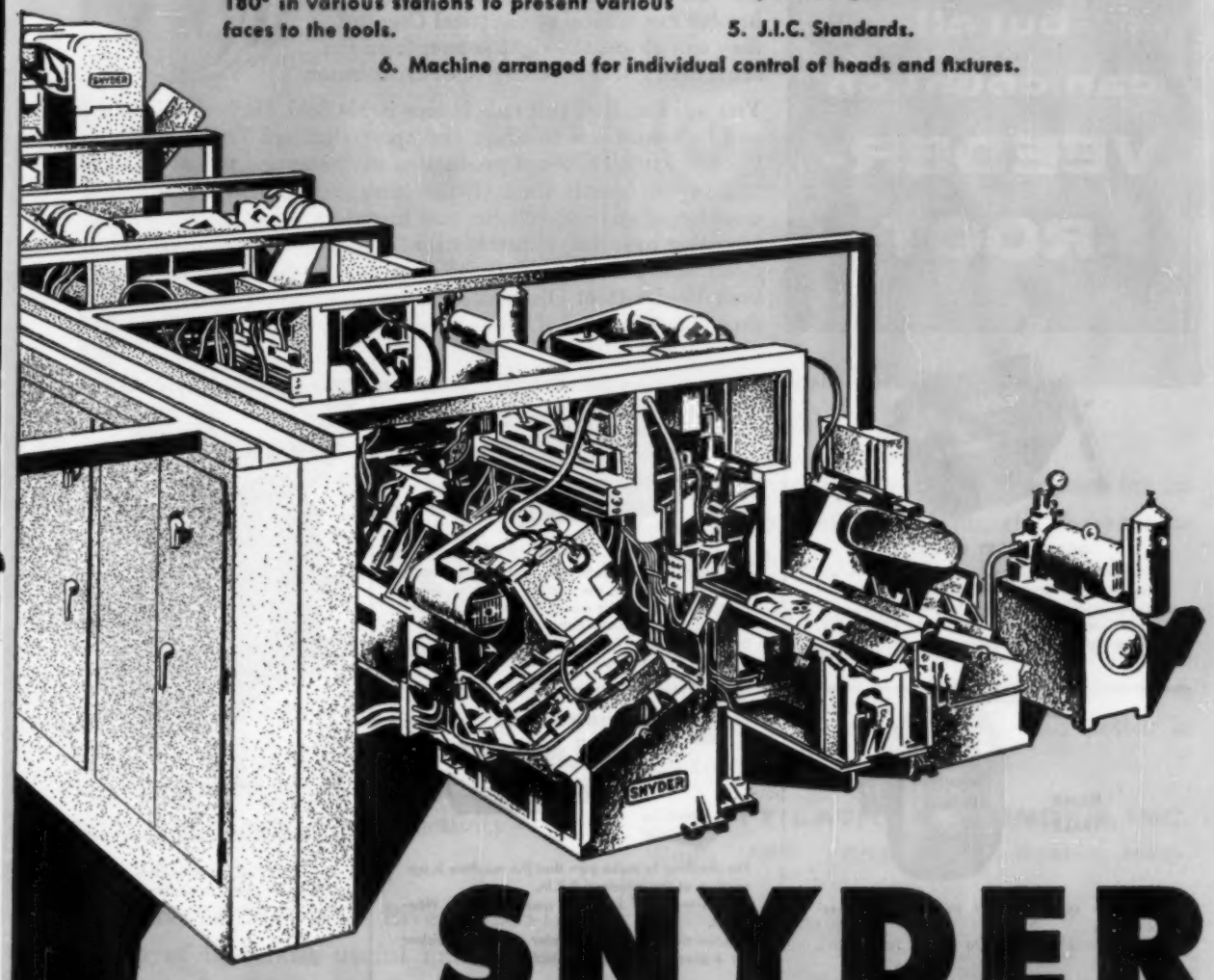


# Transfer Machines Processes Either Castings from Rough to Finished Parts

**Combination of two special transfer milling machines in parallel, with automation, feeding into one special transfer drilling machine gives production of 136 pieces per hour**

**Special Features of Snyder Machines Nos. 55-60 and 55-61**

1. Machine line handles two or four barrel manifolds, random intermixed; sensing devices automatically instruct the proper drilling and tapping units.
2. Part rotated vertically 180° and horizontally 180° in various stations to present various faces to the tools.
3. Individual electrical panels and hydraulic units for each segment.
4. Wing bases, sections, spacers and risers standard throughout for easy adaptation to future part changes.
5. J.I.C. Standards.
6. Machine arranged for individual control of heads and fixtures.




# SNYDER

**TOOL & ENGINEERING COMPANY**

**3400 E. LAFAYETTE • DETROIT 7, MICHIGAN**

*32 Years of Special Machine Tools with Automation*

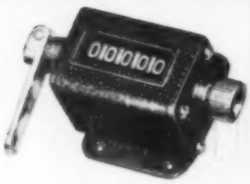
# No Two Plants

# are alike...

but all can count on VEEDER-ROOT

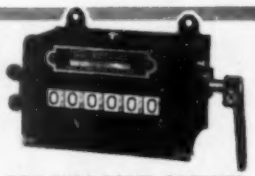
Sure, everybody's manufacturing problems are "different." But when these problems involve mechanical or electrical *Count*rol, they can *all* get the right answer from the same man . . . the Veeder-Root Distributor.

You will find that this man is tops in his field. He knows industry, and he knows how to adapt and apply standard Veeder-Root Counters to all types of production machines and processes, to give you exactly the facts-in-figures you need. If it's a question of quality, volume, cost inventory, production, wage or incentive payment, remember that *you're never sure unless you count*. And remember that the man you can always count *on* is your Veeder-Root Distributor. If you don't know who he is, just drop a line to D. G. Dresser, Veeder-Root Inc., Hartford 2, Conn.



**SMALL RESET COUNTER**

A compact, rugged reset counter for moderate duty in parts inspection, quality control, conveyors, machine tools, light presses, etc.
Dimensions: 1¾" long, 1 19/64" high, 1 1/16" wide.
Speed: Up to 1000 counts per minute.



**BOX-TYPE RESET COUNTER**

For punch press installations, conveyors, metal-working equipment, die casting, plastic-molding, rivet, spring and wire machining, or any installation requiring a heavy duty counter.
Dimensions: 4¼" long, 2 21/32" high, 3⅜" wide.
Speed: 500 counts per minute.

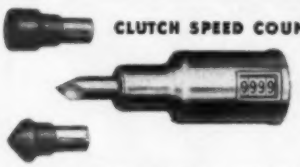
**RESET MAGNETIC COUNTER**

For remote indication of machine operation from plant to office.
Dimensions: 3 1/16" long, 2½" high, 1⅝" wide.
Speed: Up to 1000 counts per minute.
Coils: 110V-AC are standard. Other voltages are available. Panel mounting feature also available.

**HAND TALLY**

For quick spot-checks of production or performance.
Dimensions: 1 17/64" long (to end of reset knob), 1⅛" deep, 2" high.
Counts one for each depression of the thumb lever, and resets to zero by a turn of the knob.

**CLUTCH SPEED COUNTER**



For checking to make sure that the machine is operating at the required R.P.M.
Dimensions: 3¼" long, ⅞" max. diameter. Non-Reset.
Internal clutch operates counter only when rubber tip is pressed against the shaft.

*Everyone can count on*

**VEEDER-ROOT**

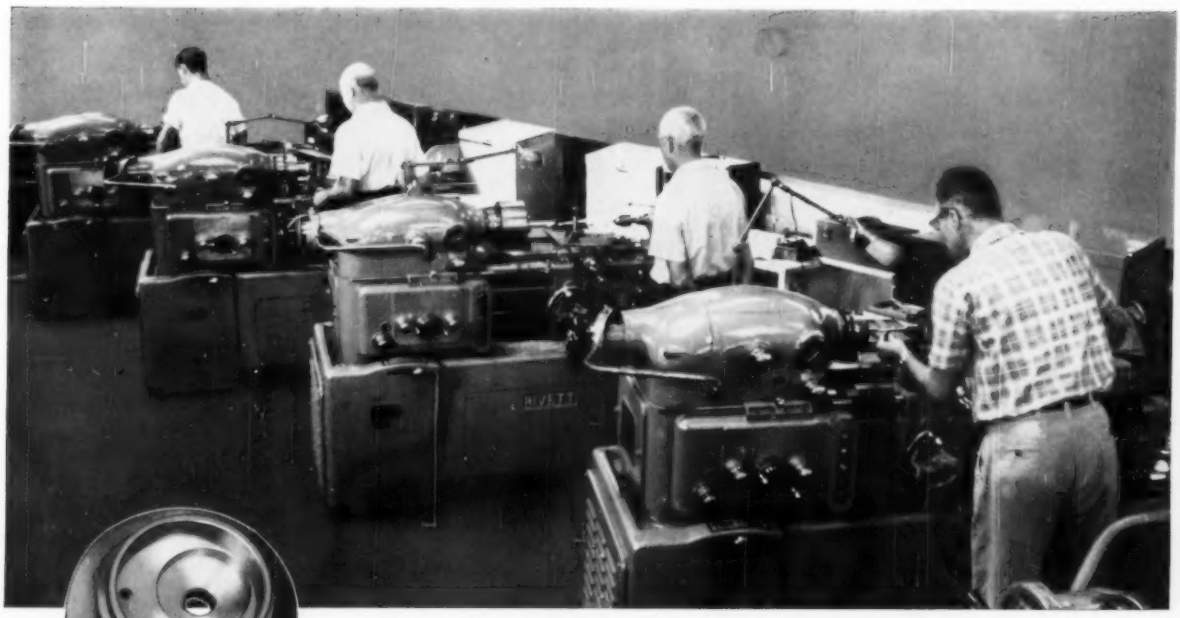
*"The Name that Counts"*

Hartford, Conn. • Greenville, S. C.
Chicago • New York • Los Angeles
San Francisco • Montreal
*Offices and Agents in Principal Cities*

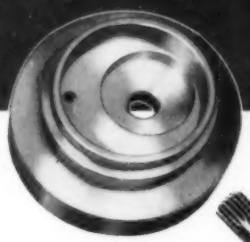
DAYSTROM
*Electric Corp.*

**– puts it on a**

# RIVETT!



Battery of Rivett 1020S Lathes in the Research and Development Division of Daystrom Electric Corporation, Poughkeepsie, N. Y.



Brass piece with off-center counterbore and through-hole completely machined on a 1020S Rivett.

Machined on a 1020S from 4140 steel *after tempering* at a Rockwell hardness of C 20-25.

## *Productivity!*

Daystrom machines model parts with an eye to normal manufacturing methods. For this reason Daystrom highlights an important Rivett feature — productivity — in its statement:

"We have found that the Rivett 1020S Lathe is one of the most useful and all around productive machines in our model shop, and is so constructed that it is easy for an average operator to obtain the dimensions and finish necessary in our work."

"Model work requires holding concentricity to .001" T.I.R. between several diameters; turning is often held to several tenths. And, a finish of 32 micro inches and better is quite easily obtained!"

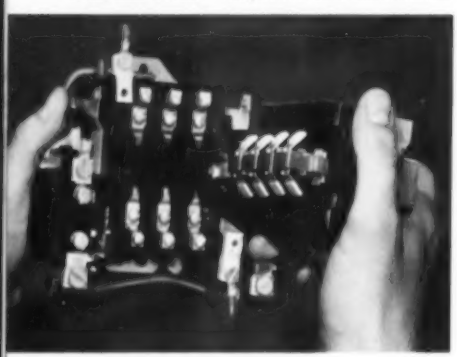
***Inquire about the 1020 Toolroom Precision Lathe now. Write for 16-page catalog and the name of your nearest dealer.***

**RIVETT LATHE & GRINDER, INC.**
Dept. AM-9 Brighton 35, Boston, Mass.

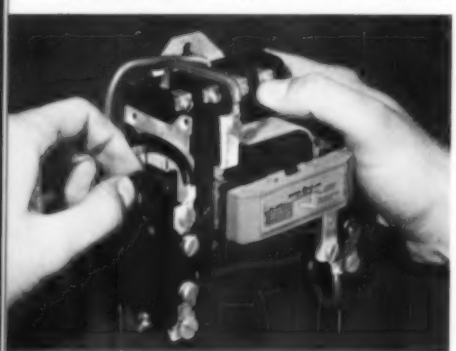
**RIVETT**
"Steelway" Lathes

**NEW** **GREATER WIRING SPACE**
Wrap-around cover—removable enclosure sides make wiring much easier.

**NEW** **SNAP-SLIDE CONSTRUCTION**
Principal components quickly disassembled for easier inspection and maintenance



**NEW** **"VERTICAL" CONTACTS**
Continuous dependable operation of new starter—even in dusty atmospheres



**NEW** **ADJUSTABLE OVERLOADS**
Overload trip setting can be adjusted plus or minus 15% of nominal heater rating.

# General Electric announces

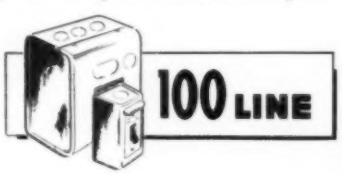
# NEW Size 0 and 1 Magnetic Starters—42% Smaller in Size

General Electric now offers a new line of Size 0 and 1 magnetic starters that is 42% smaller than previous open forms and is built to the new NEMA ratings. The new starters with "snap-slide" construction provide easier inspection and maintenance because principal components snap or slide together. Completely new and radically different in design, this line of starters offers:

- wrap-around cover with spring latch—easily removed without tools for inspection
- removable sides for greater accessibility
- straight-through wiring speeds installation
- pressure-type terminals make wiring easy
- vertically-slanted contacts give higher tip pressure, reduce possibility of contact welding
- long life "kick-off" spring provides clean break of contacts in any mounting position
- strongbox coil with Mylar* insulated start wire for longer coil life
- overload relays adjustable for ±15% of trip setting
- nine field modification kits for greater flexibility
- new maximum NEMA ratings up to 7½ hp at 220 volts and 10 hp at 440 volts

Two additional features of the new magnetic starter are extremely quiet operation and lower inrush requirements of the coil. Sound absorbing material around the magnet lowers the operating noise level. Lower coil inrush current will allow you to use a 47% lower rated control transformer with this starter—saving you money and mounting space.

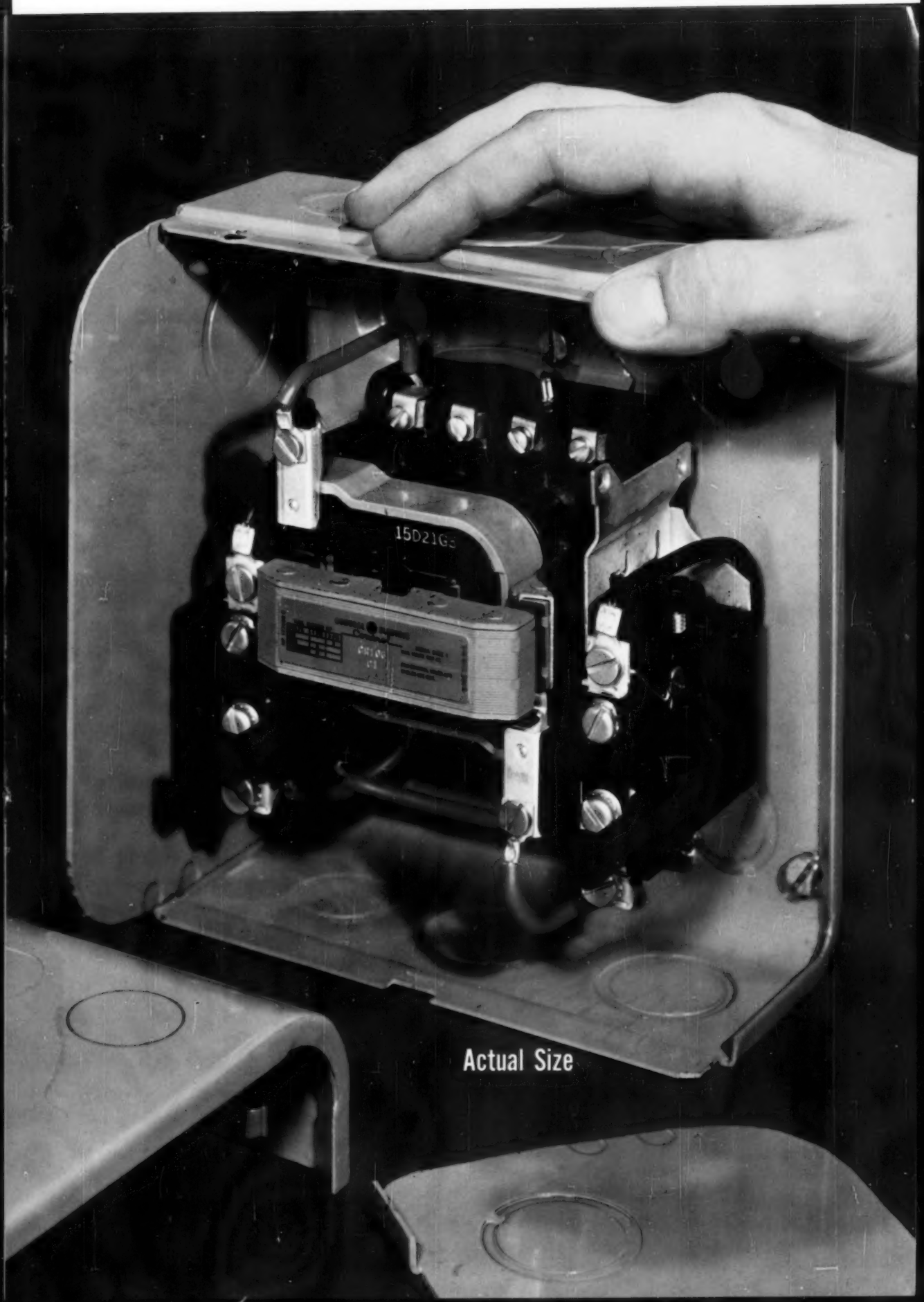
Size 0 and 1 General Electric starters are available now in non-reversing, combination, reversing and multispeed forms. Contact your nearest General Electric Sales Office or Distributor, or write Advertising Section 731-13 for the 20-page bulletin describing the line. Ask for GEA-6611. General Electric Company, Bloomington, Illinois.



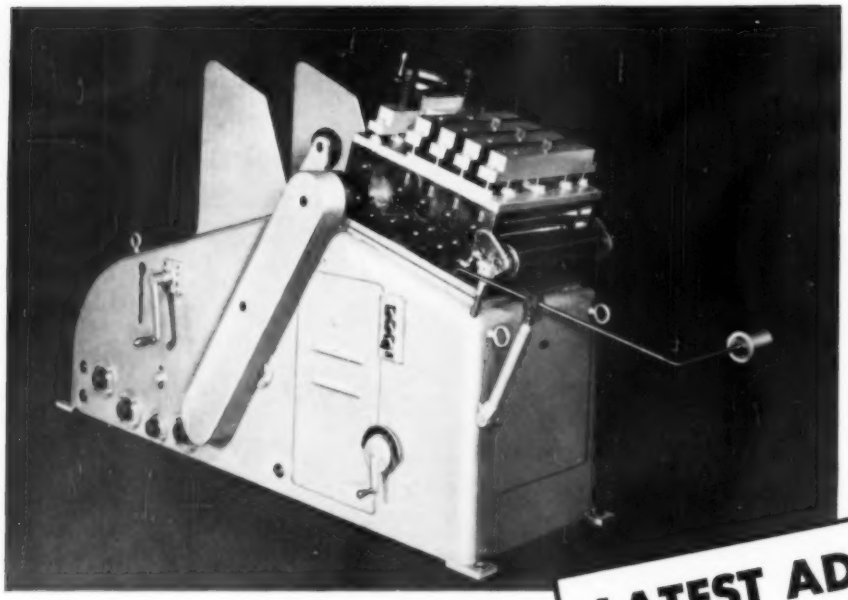

*Trade-mark of DuPont Co.

*Progress Is Our Most Important Product*

GENERAL ELECTRIC




Actual Size



## LATEST ADDITION TO THE LINE OF U S PRODUCTS FOR EFFICIENT COIL HANDLING

Units in the line of U. S. Automatic Press Room Equipment are designed to help you reduce stamping costs through the efficient use of stock in coils. The Model PDSC-1648 Combination Coil Cradle—Power-Driven Straightener illustrated above, has a capacity for material up to 16 inches in width, ⅛-inch in thickness, in coils up to 48" O.D. It is the latest addition to the U. S. line designed to help you gain all the cost-cutting potential inherent in the use of coil stock. Where floor space is a factor, a Combination Unit like this can often be used in an area too small to accommodate a separate Straightener and Cradle.

Satisfactory feeding into the press is often dependent upon: (1) the straightness of the stock and (2) the manner in which the coil is supported and unwound. U. S. Stock Straighteners, Stock Reels, Coil Cradles and Combination Units are built in a range of sizes and types to suit your particular requirements.

Ask for Bulletins 80-A and 95-A for detailed information on units in the line of U. S. Automatic Press Room Equipment.

**U. S. PRODUCTS**

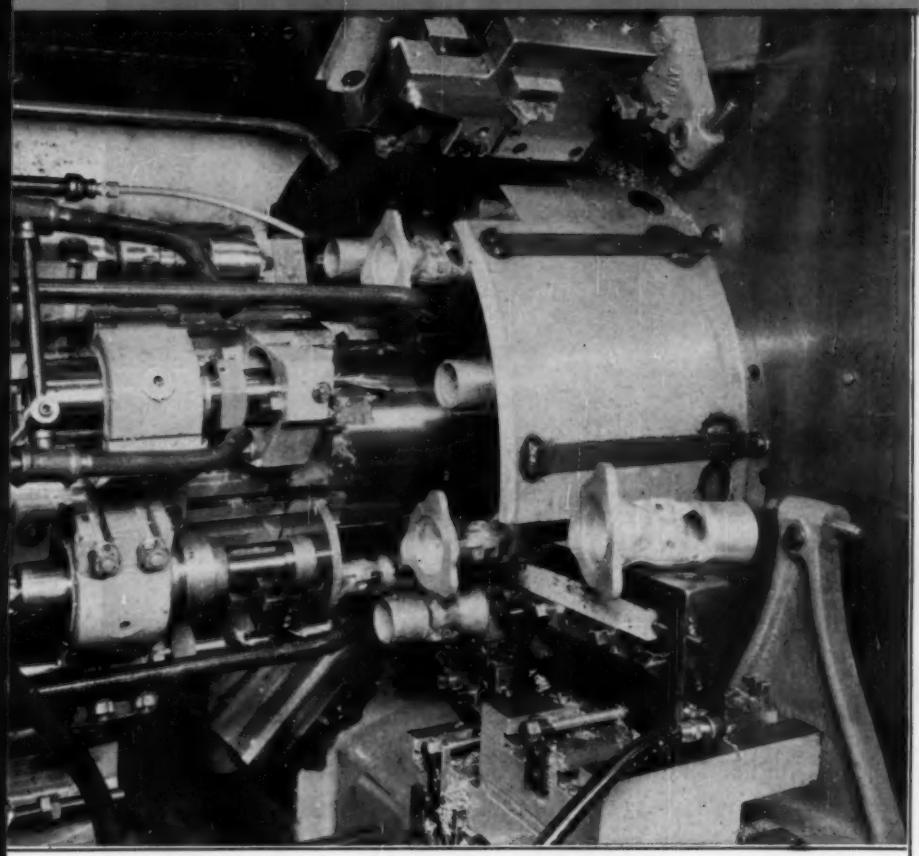
Slide Feeds
Roll Feeds
Stock Straighteners
Stock Reels
Stock Oilers
Coil Cradles
Wire Straighteners
Die Sets
Multi-Slides ®
Multi-Millers ®

# U. S. TOOL COMPANY, Inc.

**AMPERE (East Orange)** **NEW JERSEY**

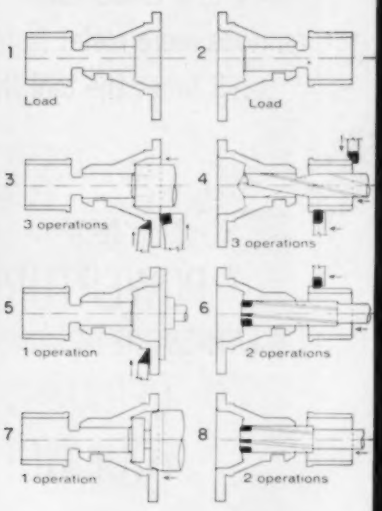
# Acme-Gridley

## RPA-8 SPINDLE CHUCKER

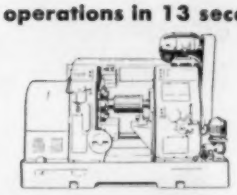


**BASKET HUB**
**ALUMINUM DIE CASTING**

**Double indexing—both ends completed at one setup on 6" RPA-8 Acme-Gridley Chucking Automatic.**




**12 operations in 13 seconds**



## SPEEDS PRODUCTION . . .

### eliminates special machine investment

When it became necessary to replace the special machine on which this washing machine basket hub had been produced, the production engineer chose an Acme-Gridley eight spindle chucker. His choice was based on two factors: lower initial investment than that required by the special machine; greater adaptability of the Acme-Gridley with proper tooling to handle many such jobs that otherwise would require special equipment.

Acme-Gridley 8-spindle automatic chucking machines give you maximum production at lowest cost per piece because of greater tooling flexibility, double indexing that permits finishing both ends of the piece at one time, and comprehensive tooling engineering that comes only from COMPLETE LINE experience.

**Write today for**
**Bulletin Nos. CM-44 and CM-51A**

**INDEX . . . to lower machining costs...**

with *Acme-Gridley*
**CONTROLLED CYCLE**

# National Acme

**THE NATIONAL ACME CO.**
**171 EAST 131ST STREET**
**CLEVELAND 8, OHIO**

**Sales Offices . . . Newark, N. J. . . . Detroit, Mich. . . . Chicago, Ill.**

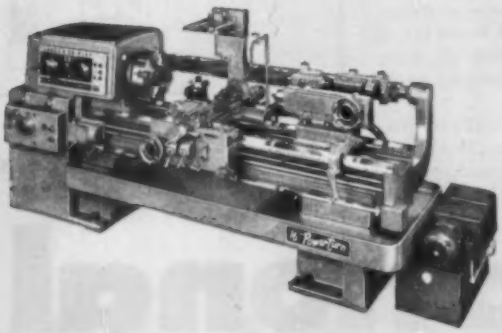
Can your new lathe utilize these ceramic tooling advantages?

...up to 2000 sfm
...30 micro-inch finishes
...turning speeds
4 to 5 times faster...
removes more metal faster
...3 times the tool life

NEW
POWERTURN
LATHES ARE DESIGNED FOR
CERAMIC
TOOLING!

... higher spindle speeds ... higher horsepower
... adequate support for workpiece and tool

exclusive elliptical girth bed • ruggedly mounted spindle • greater carriage bearing • rigid tool mounting • wide range of feeds • hardened and ground replaceable cross-slide ways



Be ready to cash in on the promises offered by Ceramic tooling. New Lodge & Shipley POWERTURN and POWERTURN COPYMATIC Lathes are designed with the features needed to fulfill the advances offered by ceramic tooling.

You get extra speed ... extra horsepower ... extra rigidity, specifically designed to permit utilization of newest tooling ... on toughest metals ... at production rates.

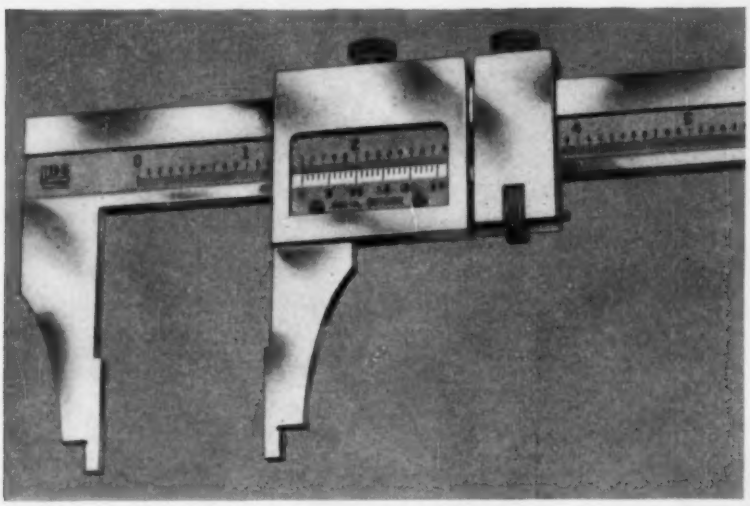
For details write to The Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

your LODGE-ical choice **Lodge & Shipley**

# Precision Tool News

B·S

REPORTING NEW DEVELOPMENTS AT BROWN & SHARPE'S PRECISION CENTER



## Users Find Double-length Vernier Plate Just Right For Easy, Accurate Reading

In the few months that the Brown & Sharpe Super-Vernier Caliper has been on the market, it has created much enthusiasm among users. The new vernier plate is twice as long, making it twice as easy to align and read. Only a fraction of an inch has been added to the over-all length of the caliper in order to accommodate the longer vernier plate; consequently the easy-to-read advantage has been gained without sacrificing the good-handling qualities of the tool.

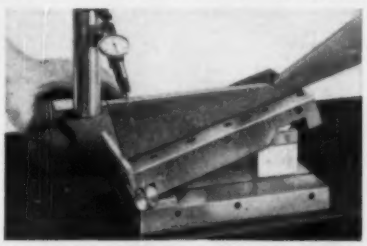
Another aid to easy reading is the reflection-free dull-chrome background, against which the jet black, machine-cut graduations stand out in sharp contrast.

## B&S Intrimik Measures Hole Diameters Directly

Intrimik ("*In*-tri-mike") is a self-aligning, internal, tri-point micrometer that measures directly the I.D. of any hole within its range. It is more economical for measuring bores and holes of varied sizes than comparators or plug gages; and in production, where all holes are held to a close tolerance, it saves expense by showing the *exact* amount of metal still to be removed. Intrimiks are available individually or in five sets, to cover from .275" to 8.000". Sets are furnished in cases with calibrating rings, and with extensions which permit accurate measurements at depths to 15".

## Brown & Sharpe Announces Precision Sine Plate at Low Price of $110

Brown & Sharpe offers this accurate, versatile new tool providing precision angular settings at a new low cost. The B&S Precision Sine Plate, No. 925, is made of case hardened and aged normalized steel . . . with a beautifully fitted hinge and glass-smooth finish. Machined and assembled to an over-all accuracy within .0002", it assures highly precise angular measurements when set to gage blocks. The working surface of the hinged plate is 3½" x 6"; distance between roll centers, 5". No. 925 has an end plate and plenty of tapped holes for special clamps or other holding devices.



*Another new B&S tool, No. 624 Planer and Shaper Gage, is the most accurate gage of its kind for tool setting.*

## Your Local Distributor Has These B&S Tools In Stock

For your convenience, Brown & Sharpe Precision Tools are stocked by leading distributors everywhere. Ask your local Brown & Sharpe distributor to show you these products, or write for additional information to Brown & Sharpe Mfg. Co., Providence, R. I.

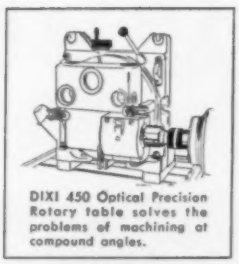
WATCH WHAT'S HAPPENING AT

**Brown & Sharpe** B·S

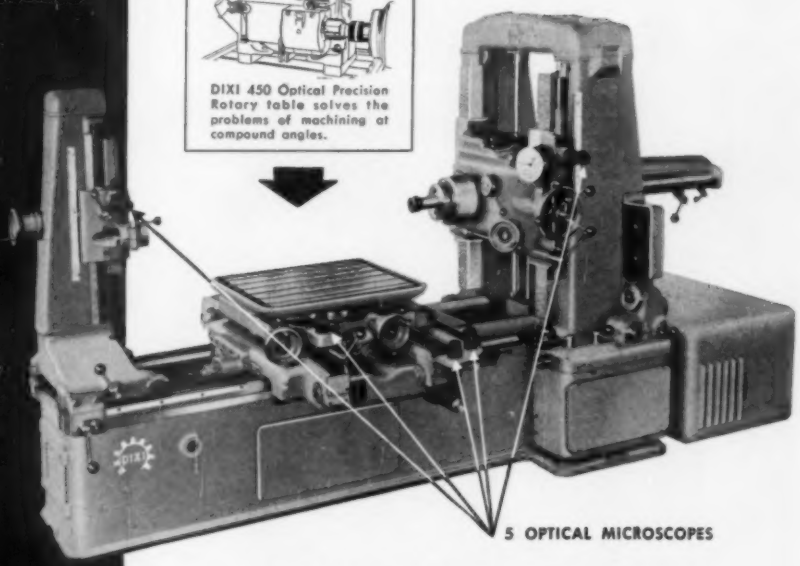
PRECISION TOOLS AND GAGES • MILLING, GRINDING AND SCREW MACHINES • CUTTERS • MACHINE TOOL ACCESSORIES • GEAR, VANE AND CENTRIFUGAL PUMPS

# DIXI 60
## horizontal optical jig borer

**The ONLY Horizontal Jig Borer Built Today! Combines the ACCURACY of the Vertical Spindle With the VERSATILITY of the Horizontal Spindle**



DIXI 450 Optical Precision Rotary table solves the problems of machining at compound angles.



5 OPTICAL MICROSCOPES

**ACCURATE:**
Optical settings provide an overall accuracy of .0002.

**VERSATILE:**
Optical settings for operations in all planes and compound angles . . . equally suitable for tooling, short-run or production work . . . permits JIGLESS boring, facing, milling and drilling.

**PRODUCTIVE:**
Saves time, labor & costs . . . Unclamping, positioning, fine adjustment, reclamping and rechecking can be made in less than 10 seconds.

The DIXI Optical Reversing Process assures perfect alignment as well as round, to-per-free holes. In work pieces with line bores on opposite sides, this is obtained by optically indexing the built-in rotary table 180°, locking the spindle feed and using the hydraulic table in-feed instead. Electrical infinitely variable speed spindle drive; infinitely variable hydraulic feeds; special features eliminate effect of spindle over hang on accuracy.

Made in Switzerland — All measurements in inches

- Guaranteed service by factory trained staff
- Engineering staff available for consultation
- Spare Parts in New York stock
- Your operators trained

DIXI 60 now in wide use in leading aircraft and manufacturing plants throughout the United States.

THIS VERSATILE MACHINE IN OPERATION at our New York, and other conveniently located Demonstration Centers.

Our Headquarters in New York City

MBI

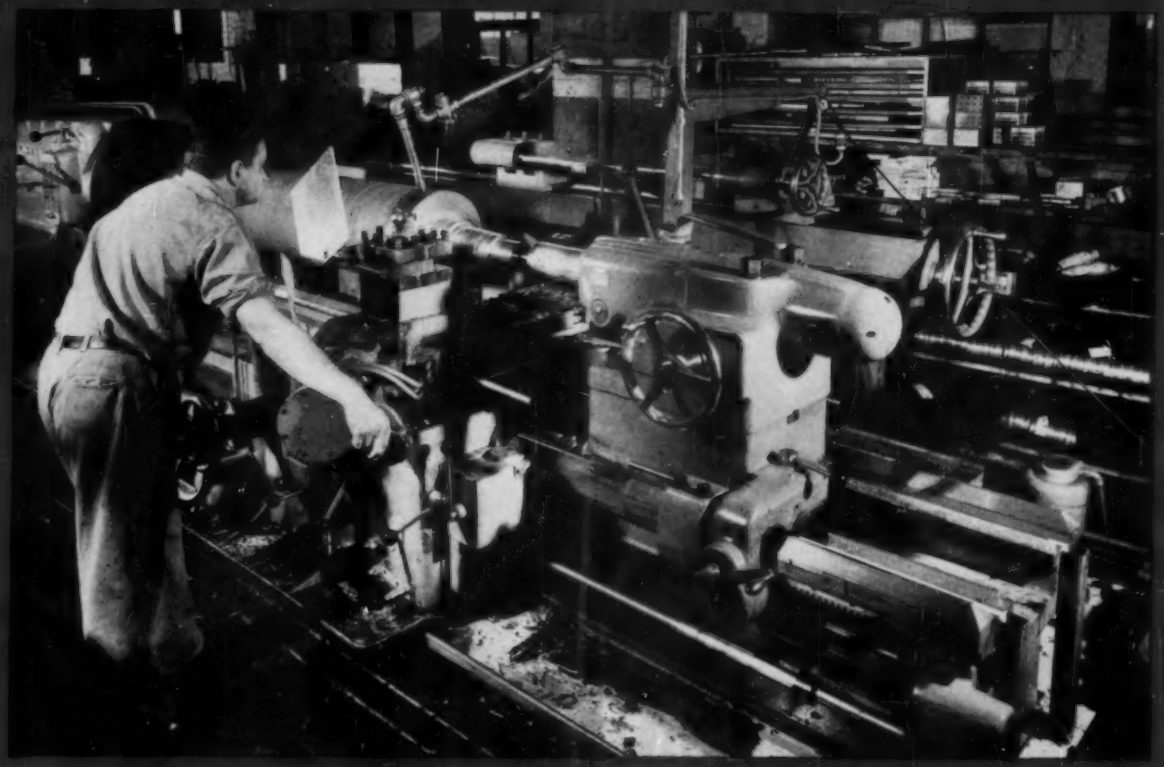
# M. B. I.
## export & import ltd.

*A Division of Machinery Builders, Inc.*

**475 Grand Concourse, Bronx 51, New York**

*"Over 25 years experience in designing & building machinery"*

# FROM 12½ HOURS... TO 4½ HOURS... plus BETTER FINISH



**Bulletin No. 135** gives a complete description and shows many examples. It's yours for the asking.

R. Hoe & Co. Inc., New York world renowned manufacturers of printing presses, has actually accomplished this in the machining of their impression cylinders.

Using a 32" "AMERICAN" Hydraulic Tracing Lathe, the cylinder journal shapes are generated from a template and the 15" diameter cylinder body is turned straight without the template control.

The all-hydraulic tracing unit in combination with the accuracy and rigidity inherent in "AMERICAN" lathes insures the highest quality of work both from the standpoint of accuracy and fine finish.

With production costs constantly reaching new peaks, industry simply can't afford to ignore such savings from modern equipment. Where else could such a magnificent return upon an investment be secured, and how else can costs be lowered to meet an increasingly competitive market?

More production per man hour is the answer and the only answer to spiraling costs—modern, high production machinery is the answer to greater production per man hour.

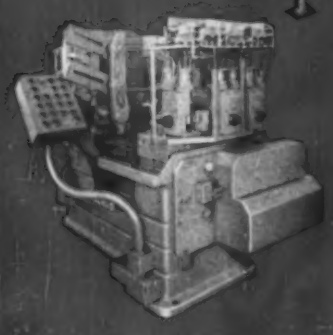
**THE AMERICAN TOOL WORKS CO.** Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

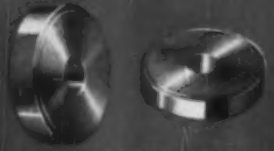
XLO

EX-CELL-O FOR PRECISION

Complete automation unit for machining steel gear blanks. Note dial groupings at gaging stations visible in this picture.



Ex-Cell-O Style 312 Cam Boring Machine adapted for automation. Components on cross slide automatically adjust tools to hold specified limits.



Typical gear blanks after automatic machining is completed.

# Standard Ex-Cell-O Machines Handle Automatic Operations

**Take these cam boring machines, for example: they are standard Ex-Cell-O 312s. When a customer's production schedule called for an unusually high per hour output of steel gear blanks Ex-Cell-O engineers incorporated these machines into an automated setup.**

**Included in the new setup: two cam-operated Ex-Cell-O Precision Boring Machines, two Gear-O-Mation storage-distribution units, three gaging stations.**

**The boring machines finish all the surfaces of the gear blanks: face both sides, chamfer both inner and outer edges, bore the central holes and turn the outside diameters. Tools are adjusted automatically to maintain required tolerances. Gage units automatically check parts prior to entering the machining stations, and the storage-distribution units provide space for a bank of parts at each machine station.**

**If you're interested in automation, but are held back by the high cost of specially designed machine tools, call your nearby Ex-Cell-O Representative today. Perhaps a standard Ex-Cell-O machine tool setup can be adapted to your automatic operation requirements. Or, if you prefer, contact Ex-Cell-O in Detroit directly.**

**EX-CELL-O**
CORPORATION
DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

57-21

# ANOTHER machine manufacturer recommends Norton Universal Grinders for.....

profit-boosting versatility

**At the New England Machine and Tool Company Plant** in Berlin, Connecticut, a Norton 10" Universal Grinder has proved its production value. This Norton customer, well-known maker of special purpose machines, reports excellent O.D. and I.D. grinding with the 10" Universal in producing many different machine parts — some of which are shown in the smaller photo.

The extra versatility and efficiency Norton builds into every Universal Grinding Machine gives many a user a "complete grinding department." Reasons why are faster O.D., I.D., face, taper and angular wheelslide grinding, including versatility for special set-ups.

*These advantages result from many job-speeding, cost-cutting features, including: rapid chucking . . . quick changes in work speed . . . Universal double end headstock . . . independent wheel and feed settings to speed up difficult jobs . . . extra capacities on wheel and work heads.*

Norton Universal Grinders are available in 10", 12", 14" and 18" swing capacities, and in a variety of between-center length capacities for your needs. The SWIVALIGN* Dual Electric Indicator is an optional extra for precise swivel table alignment. For further facts on these "complete grinding departments," see your Norton representative or write us direct. And remember: only Norton offers you such long experience in both grinding machines and grinding wheels to bring you the "Touch of Gold" that helps you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Mass.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

*To Economize, Modernize with* **NEW**

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**GRINDERS and LAPPERS**

*Making better products... to make your products better*

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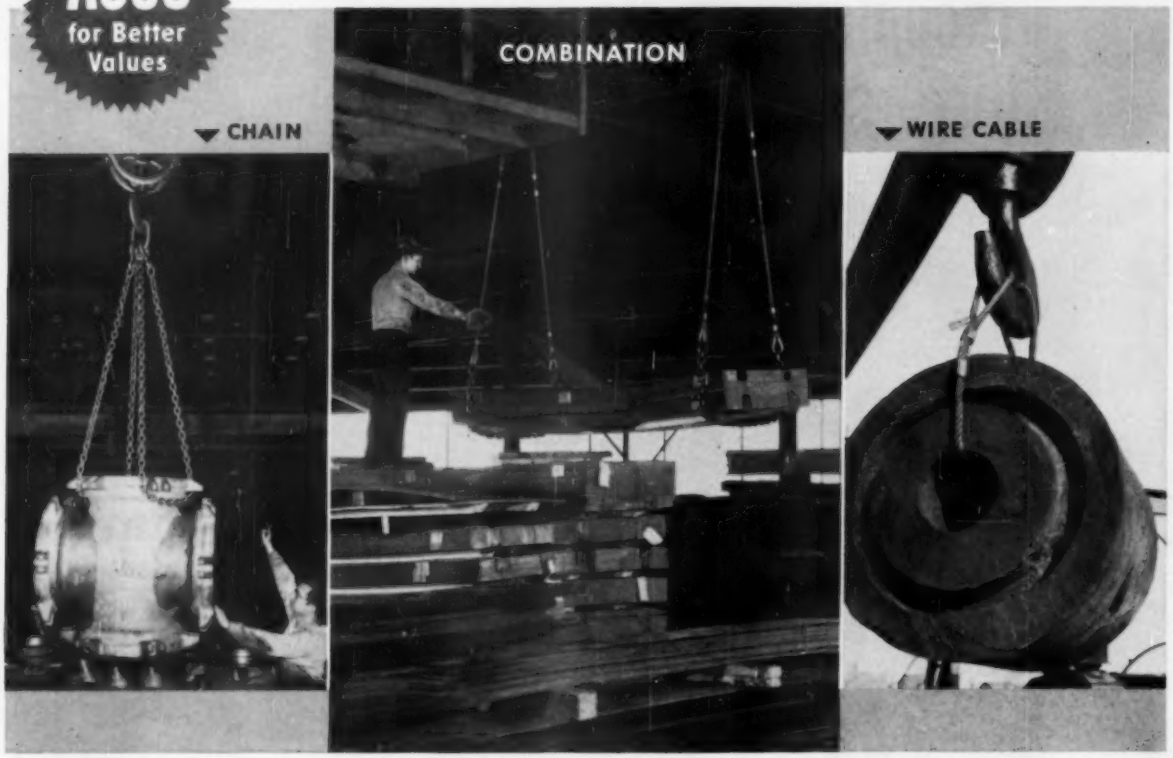
*District Offices:* Worcester • Hartford • Cleveland • Chicago • Detroit

ACCO for Better Values

# Acco Registered® Slings—Chain and Cable




# ACCO—your first source for any sling for any job

Whatever your sling requirements, there's an ACCO *Registered* Sling to do your particular lifting job in the safest, most economical way possible. Your rigger knows why certain slings should be used to lift certain types of loads, depending on varying factors of shape, weight, material and finish. Sometimes chain slings are necessary; other times cable; and on certain lifts a combination of chain and cable slings are best.

Because sling work requirements do vary from job to job, make certain that all your slings are precision-made under uniform conditions of quality control and pre-tested before they leave the factory. Only ACCO *Registered* Slings can give you this assurance...in the widest range of sizes and styles from any single source.

In addition, you get the latest technical improvements in ACCO *Registered* Slings. For example, there's the new shaped Master Link now available without extra charge on all ACCO *Registered* Slings. This new link, an exclusive development of ACCO engineers, gives 18% greater resistance to distortion with no increase in weight. Just one more quality bonus you get from ACCO *Registered* Slings.

Each of these slings is factory proof-tested at a load of no less than twice its rated capacity. Only after a sling has passed this rigorous test is it given the ACCO tag and certificate of registration.

Tell your distributor you prefer ACCO *Registered* Slings.

**WHAT "ACCO REGISTERED" MEANS**

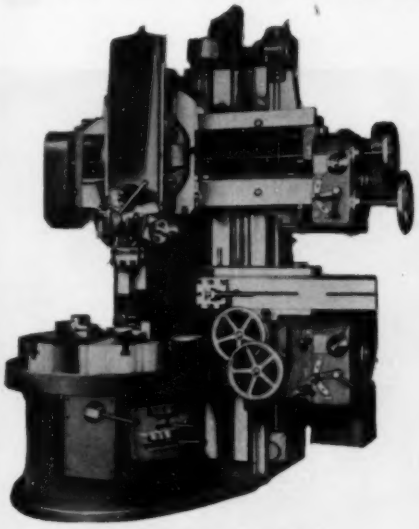
1. The best material
2. Unit safety factor (on bodies, rings, links, hooks)
3. Proof test of complete sling to twice the working load limit
4. Actual field service test of each design
5. Metal identification ring or tag on each sling
6. Signed Registry Certificate with each sling

**AMERICAN CHAIN & CABLE**
**BRIDGEPORT, CONN.**

ACCO

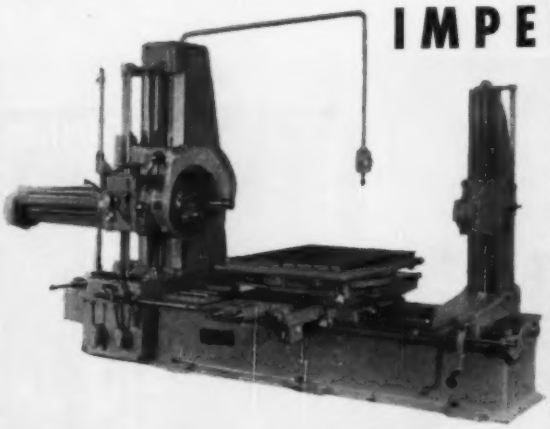
Atlanta, Boston, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Wilkes-Barre, Pa., York, Pa.
In Canada: Dominion Chain Co., Ltd., Niagara Falls, Ont.

# OUTSTANDING NEW MACHINERY...
# *AT LOWER COST!*



**NILES-IMPERIAL**
**41" - 51"**
**VERTICAL TURRET LATHE—30 H.P.**
**$24,985**

## IMPERIAL

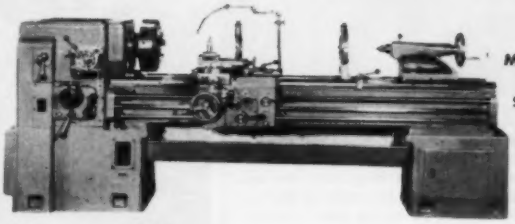


HORIZONTAL, BORING, DRILLING & MILLING MACHINES

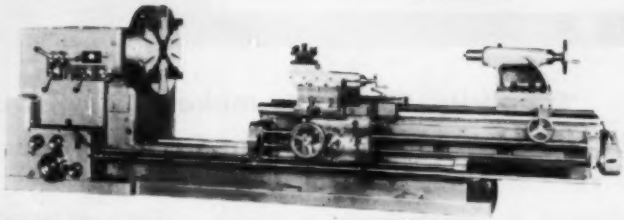
Sizes: 2¾", 3¼", 4", 5", 6¼", 8"

**from $9,988. to $47,880.**

## IMPERIAL LATHES FLAME HARDENED AND GROUND BED WAYS

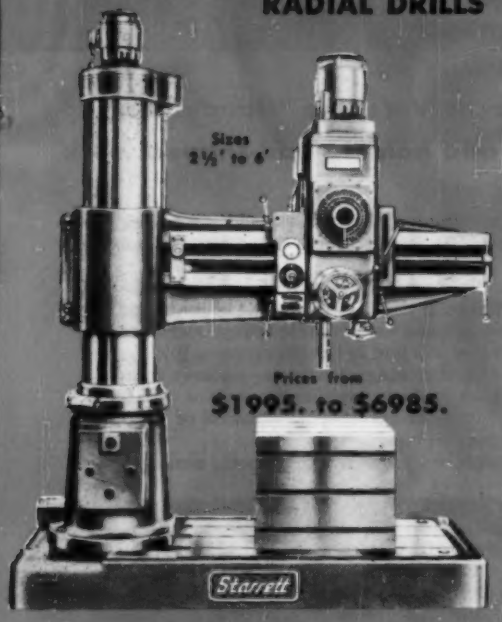


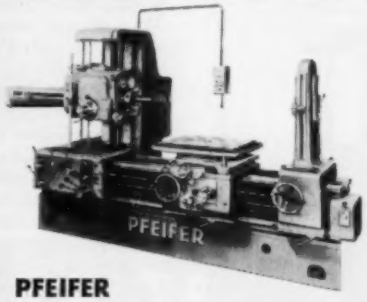
**Model MP — 24/35**
**$7,985.00**
Swing over ways 24";
Swing in gap 35"



**Model PS — 34/61**
SLIDING BED GAP LATHE
Swing over ways 34";
Swing in gap 61"
**$12,990.00**

## STARRETT
### RADIAL DRILLS




**PFEIFER**
Precision Boring Mill
**from $9,988. to $14,295.**

## AARON
### MACHINERY CO., INC.

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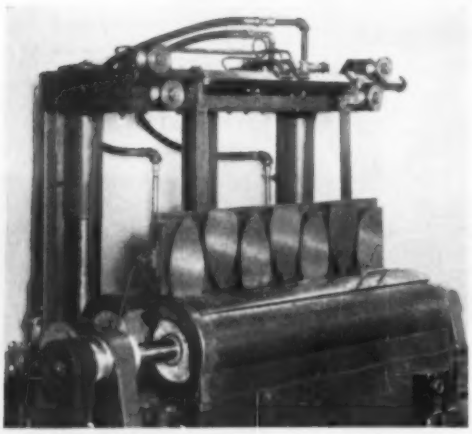
***Liberal Terms - Rentals***

Lathes, Mills - Vert. - Horizontal, Grinders - Surface - Cylindrical, Shapers, Drills, Tappers, Duplicators, Brakes, Shears, Welders, Bending Rolls, Band Saws, Radial Drills, Boring Mills - Vert. - Horizontal, Engravers, Presses.

# Taft-Peirce Magnetic Chucks bring

Here is a special Superpower Chuck built to hold cast iron loomsides on a 75 hp milling machine. Size of chuck is 55½ x 40". Three 18" carbide cutters and two 4" mills take simultaneous ¼" cuts at thirty inches per minute. Taft-Peirce chucks can do a wide variety of this type work when properly engineered for the job.

***Simplicity, flexibility make Superpower Chucks Versatile "Handymen" in milling, shaping, profiling, layout, inspection and holding odd-shaped work***



A Taft-Peirce Superpower Electromagnetic chuck was artfully applied to put flat iron bases through a glazing machine. Both sides of the chuck are loaded, holding fourteen pieces at once — a greatly simplified arrangement.

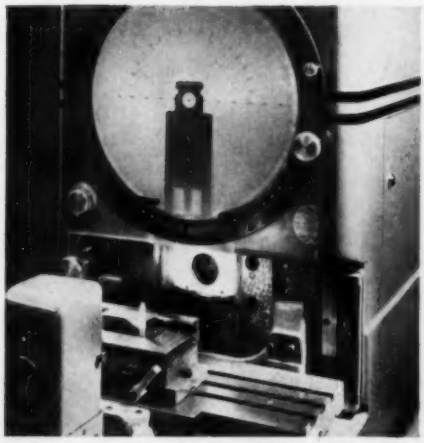
The art of magnetics is making magnetic chuck-held machining and inspection a new and intriguing source of cost and time savings throughout the plant.

To give you every possible opportunity to make use of these advances, Taft-Peirce offers the most complete line of magnetic chucks, work drivers and accessories available today. Here are just a few of the features you will find in the Superpower line . . .

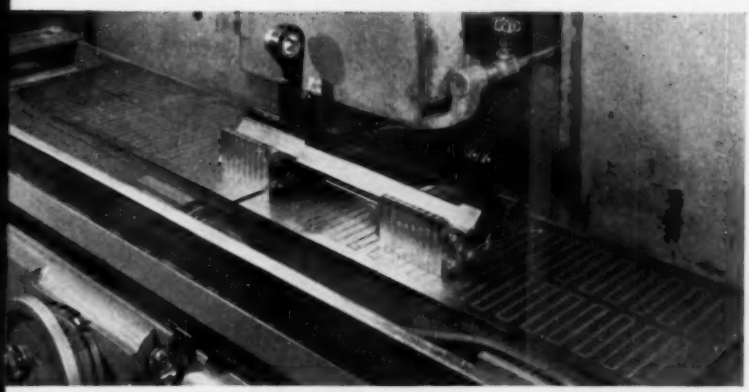
- Choice of Permanent or Electromagnetic types — allows complete freedom of selection for every application.
- Maximum useable power — scientific concentration of magnetic forces, more magnetic poles.
- Low heights, light weight — more working room, easier to use and handle.
- Extreme precision — rugged construction, skillful manufacture and careful assembly.

Look at Taft-Peirce Magnetic Chucks as a versatile device. The photographs here cover just a few of the many possibilities which you can use to develop new ideas. Special chucks for unusual holding applications are designed and built on order; and help in adaptation of standard sizes and types will be expertly provided. Write for Catalog No. 412 — a comprehensive story of magnetic chucking with data on complete Taft-Peirce line.

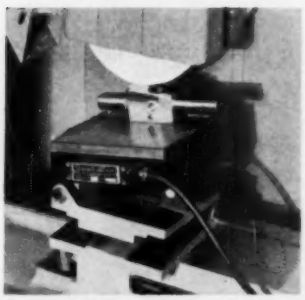
# New Cost Savings to Workholding



A clever inspector is using this combination of a Taft-Peirce Permanent Magnet Chuck and Magnetic Parallel to hold parts for optical gaging. Chuck accuracy assures precision, and minimum residual magnetism allows rapid on-off handling.

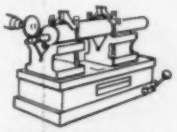


Two 12" x 36" Superpower Magnetic Chucks are tandem mounted and used in conjunction with magnetic V-Blocks to handle this piece on a 72" surface grinder.



Grinding simple and compound angles becomes very easy and precise when you use Taft-Peirce Magnetic Angle Plates. This compound angle is being ground on a No. 9866-2.

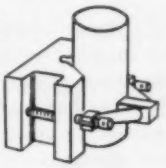
## Tips and IDEAS on MAGNETIC CHUCKING



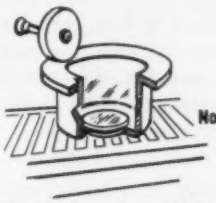
Grinding Keyway or Slot

Here is an easy method to grind a keyway or slot, particularly on irregular or odd-shaped workpieces. Use Superpower chuck as base, set up work on standard V Blocks and grind as required. Will hold to precision tolerances.

This adjustable dummy arrangement is a convenient way to set wheel height for finishing to a given dimension. Mount dummy in V Block, clamp it to required height and apply layout dye. Touch wheel to top of dummy.



Adjustable Dummy or Size Block



Holding Non-Ferrous Parts

Parts made of non-ferrous material can be held on magnetic chucks by utilizing apertures or openings where the workpiece will be resting on chuck faceplate. Steel slugs inserted through these holes will give firm holding power for most grinding operations.

**TAKE IT TO TAFT-PEIRCE**

THE TAFT-PEIRCE MANUFACTURING CO.
WOONSOCKET, R. I.

T-P Means TOP Precision

# A NEW AID FOR COST-CONSCIOUS MANAGEMENT

You can now determine just how much productivity you are losing because one or more elements of the operating cycle of an automated machine are not perfectly timed.

Now you can spot any timing error to within a 60th of a second immediately.

## Cycle Analysis

Sheffield's new Monitorecord* system analyzes timing by means of a printed, composite time graph. This shows every start, dwell and stop of each interrelated event in the complex machine cycle — just as it occurs.

## Corrective Adjustment

When a Coded Master is laid over the time graph you see just what adjustments are needed and the amount of each. No tedious groping — no costly down-time.

What could serve Preventive Maintenance more effectively than taking such a graph every day? What could save as much set-up time? This system often justifies its cost the first time it is used.

System installation is no problem. It can be applied to machines now in service or it may be built into new machines.

The readily portable Monitorecord is merely plugged into the system receptacle of any machine requiring cycle analysis. It can be moved about at will.

Get all the facts on this profit-conserving idea. Write to the *Sheffield Corporation, Dayton 1, Ohio, U.S.A., Dept. 1.*

*Trademark

7828

the SHEFFIELD corporation

...surement for mankind

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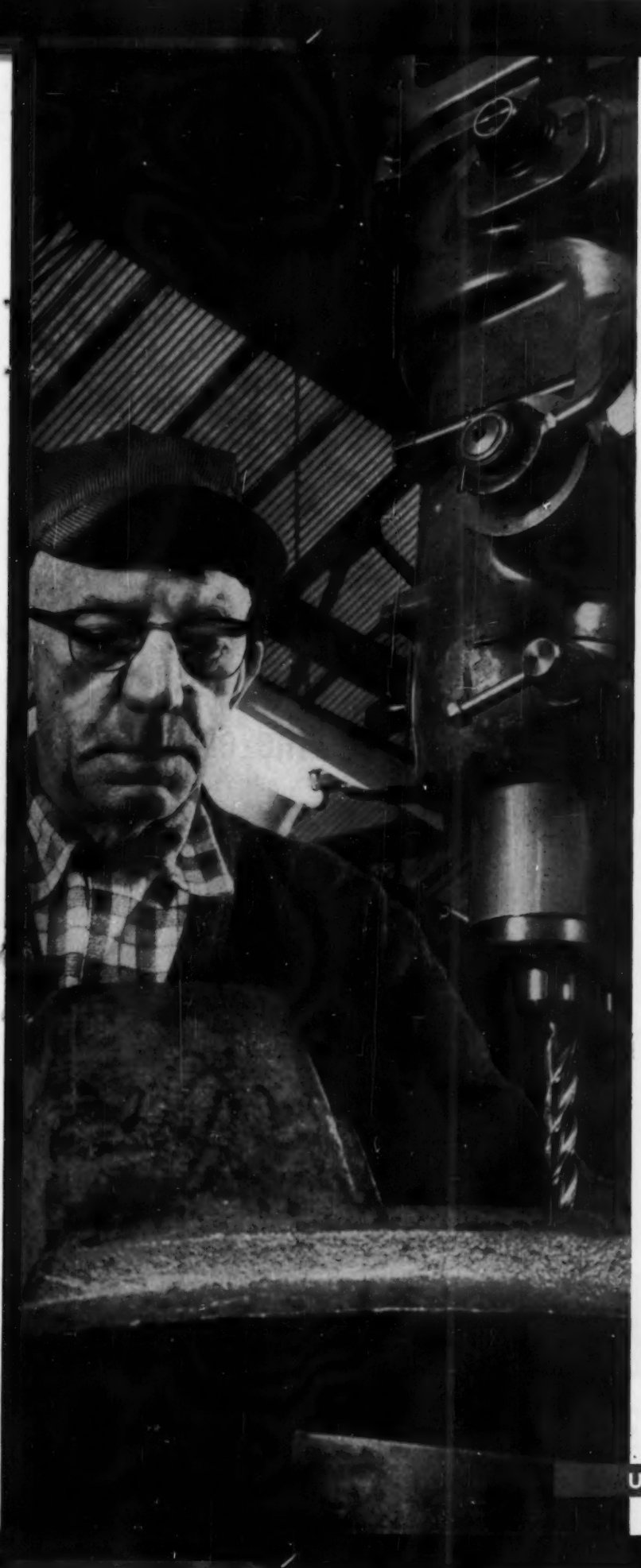

*Stainless Steel*
*machining information:*

# drilling is easy—if you're careful

When you drill chromium-nickel (austenitic) Stainless Steels, use the shallowest punch mark possible. If you punch too deep, there will be a hard spot, and you'll have trouble starting the drill. Most fabricators use a triangular or square-pointed punch for this reason.

High speed, short-twist drills should be used. They should be ground slightly flatter than usual, and with a greater back clearance than you would use for carbon steel. High speed drills are recommended, although for very smooth holes you might try carbon steel drills because you can often put a sharper edge on them.

Be sure that you use enough power and pressure to get a continuous cut; otherwise the drill will ride in the bottom of the hole and work-harden the steel. A backing plate should always be used, because austenitic Stainless Steels will not break out ahead of the drill.

Try step drilling for very deep holes. Keep the drill cool, and always use a cutting compound such as the lard oil-sulfur mixture described on page 58 of our Stainless Steel "Fabrication" book. Don't you have a copy of the book? Just write on your company letterhead to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

UNITED STATES STEEL CORPORATION, PITTSBURGH
AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
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PIPE · TUBES · WIRE · SPECIAL SECTIONS

UNITED STATES STEEL

# Acme-FETTE

**NEW SERIES - "N" SELF-OPENING THREAD ROLLING HEAD**

## lets you use your present equipment

***(either rotating or stationary spindles)***

## for rolling threads from the end

**VERSATILE**—Same head can be used on any type of turning equipment—either rotating or stationary spindles—on all jobs which permit clearance for front plate. Reduces secondary operations.

**FAST**—Thread rolling speeds are equal to turning speeds with high-speed tool steels—on all ferrous and most non-ferrous materials; up to 5 times faster than conventional thread cutting methods.

**SMOOTH, TOUGH, EXTREMELY ACCURATE**—Metal flows to full depth of thread; forms a dense, uniform structure with no cratering at the crest; provides a burnished thread surface remarkably resistant to wear and corrosion.

**NO CHIP PROBLEM**—Thread Rolling with an Acme-Fette is ideally suited to multiple-spindle tooling setups.

**FOR EITHER LONG OR SHORT RUNS**—Production records (names on request) prove substantial cost savings due to easier setup, less down time and more mileage per set of rolls.

**WIDE RANGE**—8 Acme-Fette Thread Rolling Heads provide for capacities ranging from 1/8" to 2".

**Check where Acme-Fette can help you keep more of your present equipment busy. Send sample or print for our recommendation — or write for your copy of Bulletin NAF-37**

ACME-FETTE NEW SERIES "N" HEAD (Size 00) Rolling No. 6-32 Class 3 Thread on a Single Spindle Automatic Screw Machine.

# National Acme

**THE NATIONAL ACME COMPANY**
**171 EAST 131ST ST., CLEVELAND 8, OHIO**
SALES OFFICES: Newark, Chicago, Detroit

# The wheel head tilts!

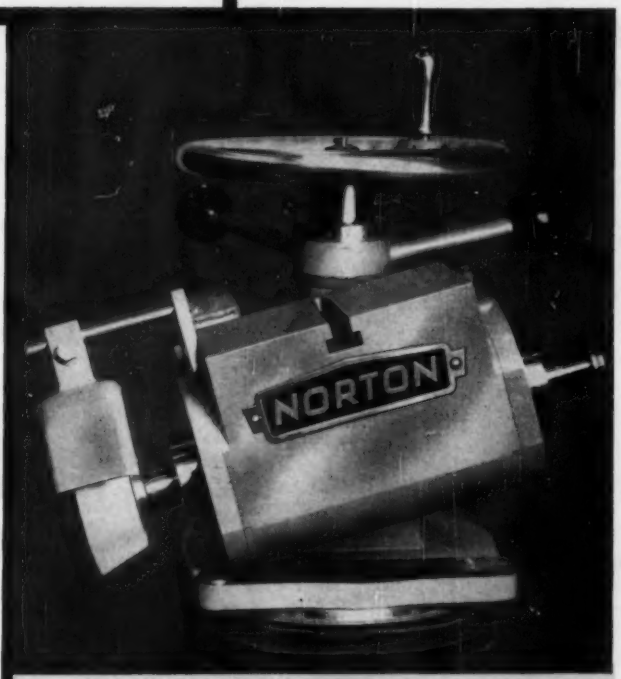
## *No other cutter and tool grinder does so many jobs and . . .*

## *saves so much money*

On the Norton No. 20 cutter and tool grinder the wheel head can be tilted up to 15° above or below horizontal, and swiveled through 360° — simplifying such difficult jobs as grinding taper reamers, step counterbores, form tools and milling cutters.

As a result of this and other pace-setting advantages, the No. 20 brings new speed and economy to the widest range of tool and cutter grinding jobs, adding the profit-boosting "Touch of Gold" to your grinding operations.

See your Norton Representative for further facts on the No. 20. Ask him for Catalog 189. And remember: only Norton offers you such long experience in both grinding machines and grinding wheels to help you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Mass.

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**NORTON**

**GRINDERS and LAPPERS**

*Making better products . . . to make your products better*

*District Offices:*
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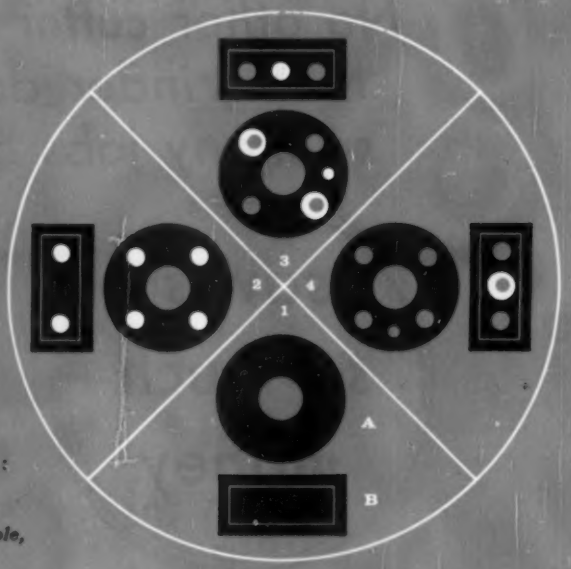
NORTON PRODUCTS: Abrasives • Grinding Wheels
Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives
Sharpening Stones • Behr-cat Tapes

# Natco Naturals

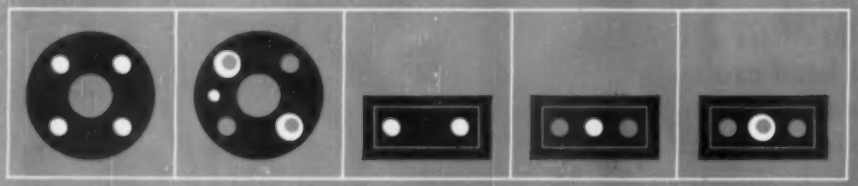
*Cost-Cutting Ways*
*You Can Use*
*Standard Multi-Spindle Natcos*

Any time your parts require machining *more than one hole*—drill, bore, face or tap—it may well be a "Natco Natural." Your standard Natco will produce substantial savings in a surprising number of situations, *even in small job-shop lots!* Call in your nearby Natco field engineer; he'll tell you in short order whether you've got a "Natco Natural" there.

# Multiple Drilling Operations on Two Part-faces

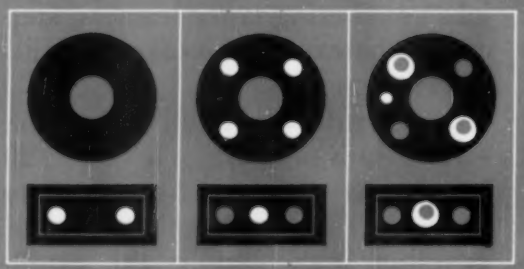



**220 parts per hour—4-position rotary table.** POSITION #1: *Unload finished part, transfer half-finished part, load new part.* POSITION #2: *Drill 4 holes, Face A. Drill and countersink 2 holes, Face B.* POSITION #3: *Drill 1 hole, ream 2 holes, Face A. Drill 1 hole, Face B.* POSITION #4: *Trepan 1 hole, Face B.*

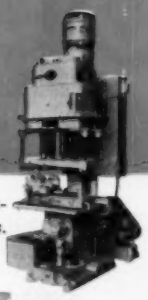


**65 parts per hour—stationary fixture** *with 5 work locations. Operator transfers parts after each stroke. One part completed per stroke.*

**40 parts per hour—straight-line indexing.** *After every 3 strokes, operator unloads finished part, transfers half-finished part and loads fresh part.*



**23 parts per hour—tumble-type fixture.** *Operator transfers and tumbles fixture from one position to the next. One part completed every five strokes.*



*Standard multi-spindle Natcos range from 1 hp, 10-spindle machines to 50 hp machines with up to 72 spindles. Spindles in standard Natcos are driven through universal joints and located by either adjustable arms of bored slip plates.*

NATCO

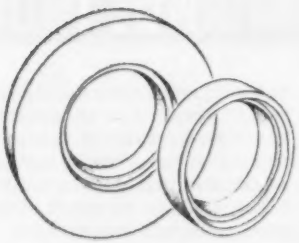
## National Automatic Tool Company, Inc.

*Richmond, Indiana*

*Multi-spindle drilling, boring, facing & tapping machines. Special machines for automatic production.*

*Call Natco Offices in Chicago, Detroit, New York, Buffalo, Boston, Philadelphia, Cleveland, Los Angeles; distributors in other cities.*

*Jim Lewis, of W. Lewis Sales Co., Cleveland, typical Bay State distributor, says, "I try to figure out how I'd meet my customers' payrolls and still make a profit. That way I get ideas I'd never have if I just concentrated on my own selling problems."*



*The "hole" on the right is all they throw away now.*

## He put one wheel to work on two machines!

Ed and John Menhart, of Cleveland's Micro-Plane, Inc., were well satisfied with the 24" x 4" x 12" Bay State wheels on their big Hanchett horizontal surface grinder. They were the only wheels they'd found in 8 years that could handle the tremendous variety of work that went through their shop.

But . . . because surface speed dwindled as the wheels wore down, grinding efficiency naturally dropped, too. This bothered Jim Lewis, the Bay State distributor who specified the wheels, because he hates to see his customers throw away "anything but the hole" in a grinding wheel.

Lewis got together with the people in Bay State's Cleveland office and figured out a solution. At their suggestion, Micro-Plane adapted a smaller Hill-Acme surface grinder that not only put the half-used wheels efficiently and profitably to work but also substantially reduced wheel costs because they no longer had to buy wheels for the Hill-Acme.

If you would like to supplement your engineering staff with an abrasive specialist like Jim Lewis, you'll find it well worth your while to talk to the Bay State man in your area. He's trained to find *practical, profitable* solutions to your grinding problems.

BAY STATE WHEELS of PROGRESS

# BAY STATE ABRASIVES

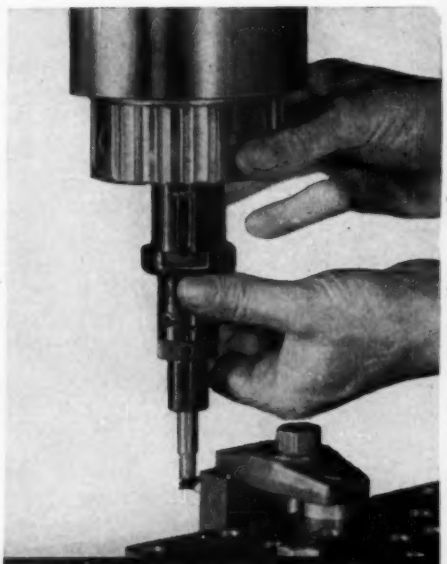
Bay State Abrasive Products Co., Westboro, Massachusetts.
*Branch Offices and Warehouses:* Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities. Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ontario.

## MEASURE

*Dial dimension direct from print.* There are two sets of direct-reading drum dials, one for longitudinal, the other for transverse position. Operator simply sets dials so that numbers on dials correspond with numbers on blueprint. Simple. Direct. Precise.

## POSITION

*Press two buttons,* one for longitudinal, one for transverse positioning. Table, and work, are automatically positioned, and clamped under the tool, accurate to ± .0001"! Accuracy is dependent upon highest-quality gages, not upon screw threads. Sensitive .0001 Dial Indicators maintain a positive check at all times.



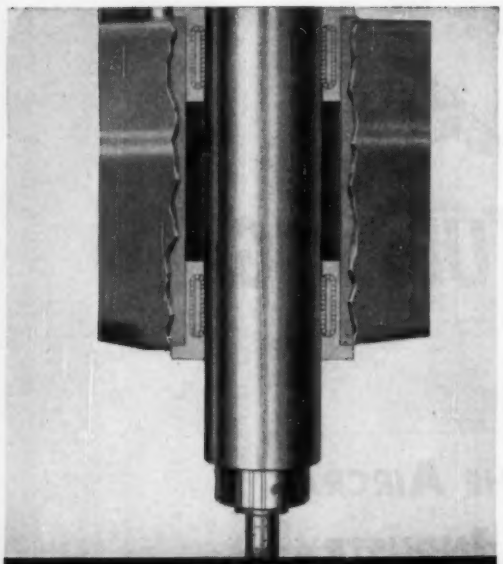
## CHANGE TOOLS

*Tool changing takes less than 10 seconds,* with BF spindle. Can be accomplished while table is positioning. Hole sizes are repeated within ± .0001", without resetting tools! High-precision tool holder is built right into the spindle of the Jig Borer. Adapters accommodate both standard and special-sized tools.

# FOSMATIC JIG BORER

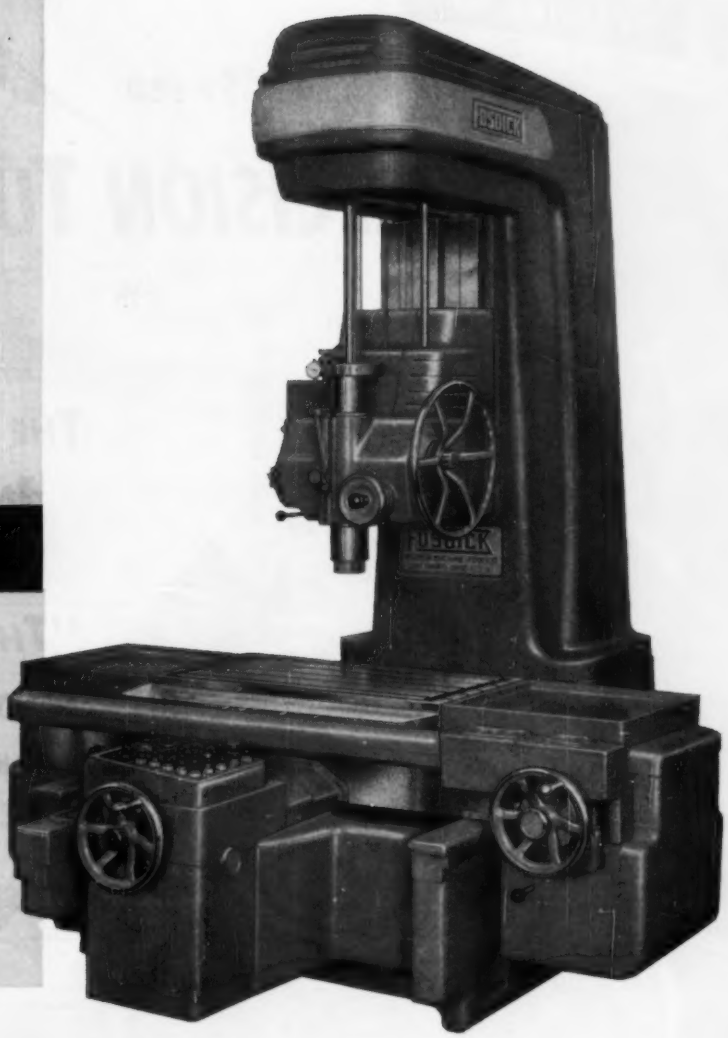
# AUTOMATIC POSITIONING

# DIRECT DIMENSION MEASURING



# BORE

*Push-button precision boring.* For finish boring, change tools quickly, then bore at touch of button. The hardened alloy steel quill rides on 800 preloaded balls mounted in precision bushings located permanently at top and bottom of head—as close as possible to spindle nose for maximum rigidity. Spindle is guaranteed not to exceed .0002″ runout at the end of 12″ proving bar!




## MEASURE - POSITION - CHANGE TOOLS START BORING . . . ALL IN SECONDS!

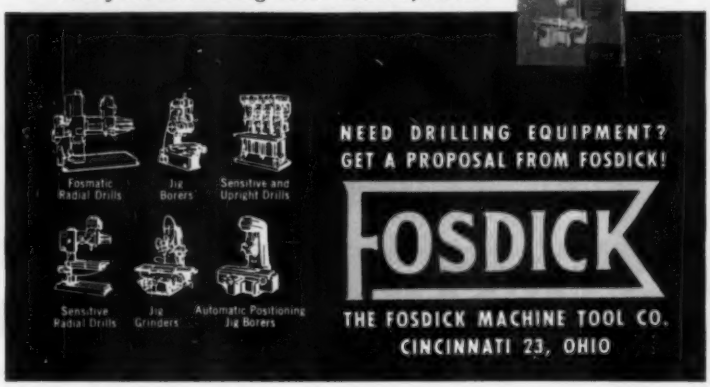
*hole size and position accurate to ± .0001.*

The new Fosdick Jig Borer can be used for the finest toolroom boring or for production of precision holes. Like the scores of Fosdick Jig Borers in plants throughout the United States, this machine will perform consistently to ± .0001″ . . . in measured table and saddle position as well as hole size.

The Fosmatic Jig Borer is extremely simple to operate. Changing of feeds and speeds, all movements of the table, saddle, and head can be accomplished by push button. Spindle is started and stopped by lever on head. Machine may be equipped with or without automatic positioning. Can be equipped for numerical control with either tape or card systems.

Other features available as extra equipment include Milling Feed, Rapid Traverse to Quill, coolant system and reversing motor for tapping.

*Ask for Fosmatic Jig Borer Bulletin, JB-A.*



# HARDINGE
ELMIRA, N.Y.

*Means* HIGH SPEED

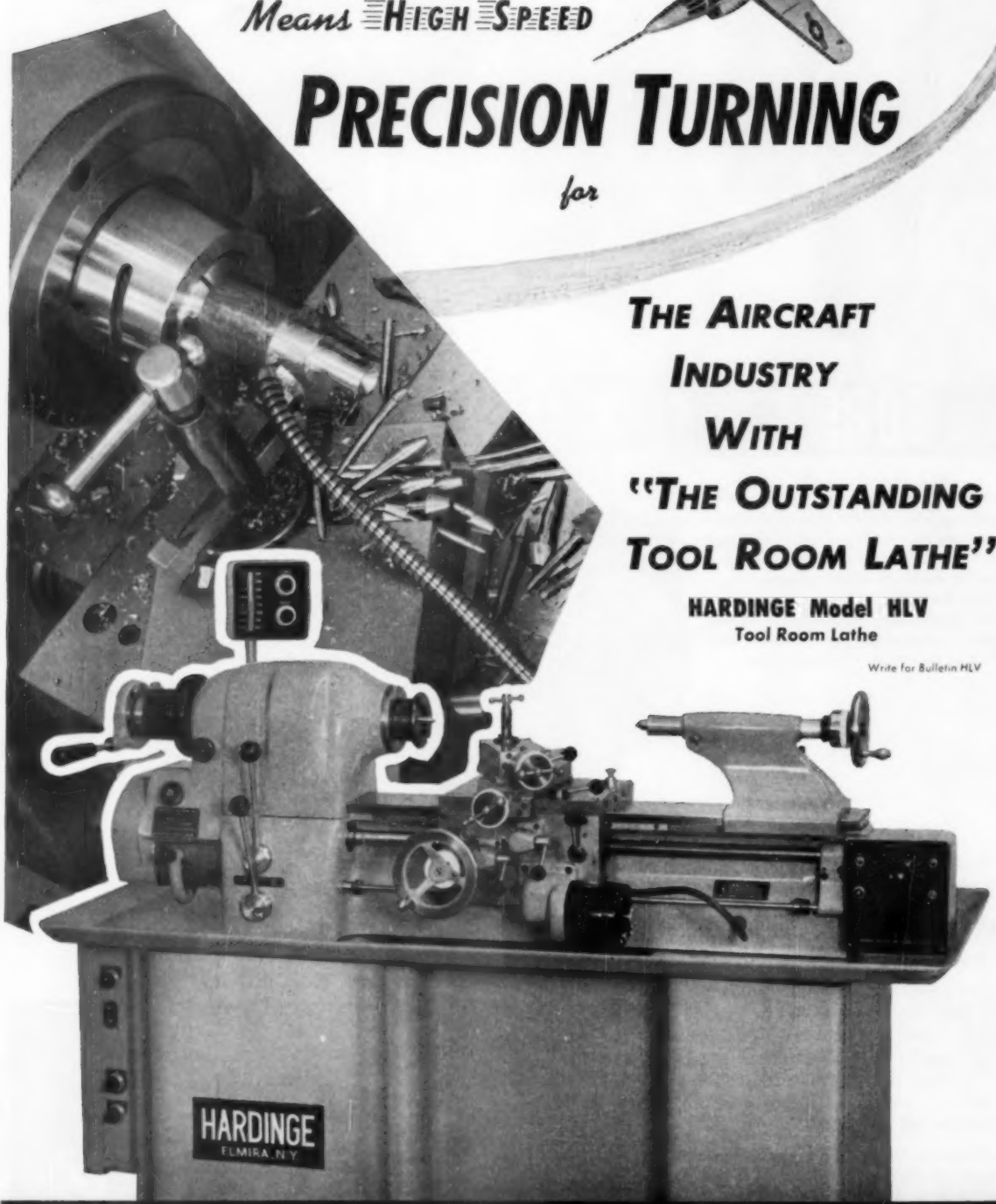
# PRECISION TURNING

*for*

## THE AIRCRAFT INDUSTRY WITH "THE OUTSTANDING TOOL ROOM LATHE"

**HARDINGE Model HLV**
Tool Room Lathe

Write for Bulletin HLV




**HARDINGE BROTHERS, INC., ELMIRA, N. Y.**

**OFFICES IN PRINCIPAL CITIES. Export office: 269 Lafayette St., New York 12, New York**

# Columbia Tool Steels for 1957-58
# with A.I.S.I. Identification and Type Classification of Tool Steels

| GRADE | Identifying Elements, in Per Cent | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Type | C | Mn | Si | Cr | Ni | V | W | Mo | Co | Cb |
| **WATER HARDENING TOOL STEELS — TYPE SYMBOL W** | | | | | | | | | | | |
| Columbia SPECIAL | W1 | .60/1.40 | — | — | — | — | — | — | — | — | — |
| Columbia EXTRA | W1 | .60/1.40 | — | — | — | — | — | — | — | — | — |
| EXTRA HEADERDIE | W1 | .60/1.40 | — | — | — | — | — | — | — | — | — |
| Columbia STANDARD | W1 | .60/1.40 | — | — | — | — | — | — | — | — | — |
| Columbia ELECTREX | W1 | .60/1.40 | — | — | — | — | — | — | — | — | — |
| VANADIUM EXTRA | W2 | .60/1.40 | — | — | — | — | .25 | — | — | — | — |
| VANADIUM STANDARD | W2 | .60/1.40 | — | — | — | — | .25 | — | — | — | — |
| | W3 | 1.00 | — | — | — | — | .50 | — | — | — | — |
| | W4 | .60/1.40 | — | — | .25 | — | — | — | — | — | — |
| WATERDIE EXTRA | W5 | 1.10 | — | — | .50 | — | — | — | — | — | — |
| WATERDIE STANDARD | W5 | 1.10 | — | — | .50 | — | — | — | — | — | — |
| | W6 | 1.00 | — | — | .25 | — | .25 | — | — | — | — |
| | W7 | 1.00 | — | — | .50 | — | .20 | — | — | — | — |
| **SHOCK RESISTING TOOL STEELS—TYPE SYMBOL S** | | | | | | | | | | | |
| BUSTER | S1 | .50 | — | — | 1.50 | — | — | 2.50 | — | — | — |
| | S2 | .50 | — | 1.00 | — | — | — | — | .50 | — | — |
| | S3 | .50 | — | — | .75 | — | — | 1.00 | — | — | — |
| | S4 | .55 | .80 | 2.00 | — | — | — | — | — | — | — |
| CEC SMOOTHCUT † | S5 | .55 | .80 | 2.00 | — | — | — | — | .40 | — | — |

†With smooth cutting free machining additives

First of a Series of Six Charts Covering A.I.S.I. Tool Steel Type Classifications

COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILLINOIS

CENTRAL OFFICE AND WORKS, CHICAGO HEIGHTS, ILLINOIS — BRANCH STOCKS IN THE FOLLOWING CITIES:

Chicago 32, 4832 S. Kedzie Ave., Phone LAfayette 3-3632
Cincinnati 25, 2716 Spring Grove Ave., Phone MUlberry 1-8400
Cleveland 14, 1640 St. Clair Ave., Phone MAin 1-1785
Detroit 3, 121 Oakman Blvd., Phone TUlsa 3-3770
Los Angeles 22, 6955 E. Bandini Blvd., Phone RAymond 3-4684
Milwaukee 19, 5202 W. Lincoln Ave., Phone LIncoln 3-5200
St. Louis 13, 5118 Easton Ave., Phone FOrest 1-0641

REPRESENTATIVES IN THE FOLLOWING CITIES: Dayton, Erie, Grand Rapids, Hartford, Indianapolis, Louisville, Moline, Newark, Portland and St. Paul

TOOL COLUMBIA STEELS

# COLUMBIA TOOL STEELS

HIGH SPEED STEELS: Clarite — Vanite — Carvite — Acmite — Cobite — Maxite — Molite — Molite Smoothcut — Molite #3 DIE STEELS: Superdie — Atmodie — Atmodie Smoothcut — E-Z-Die Smoothcut — Oildie — Exl-Die — Framdie HOT WORK STEELS: Clarite HW — Formite No. 3 — Formite No. 2 — Molite HW10 — Vanadium-Firedie — Alcodie — Firedie

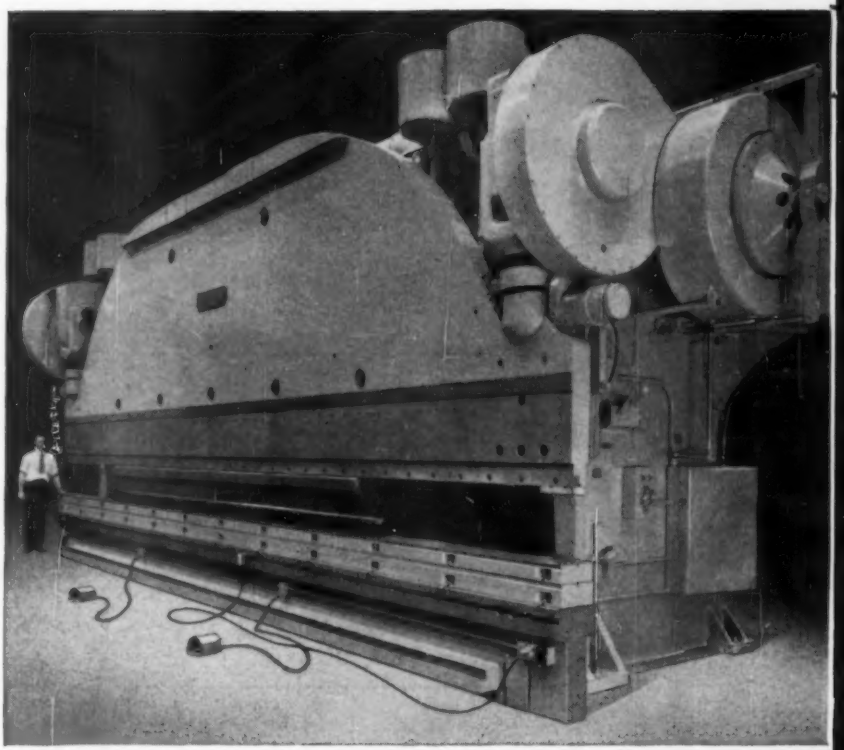
# CINCINNATI
# PRESS BRAKES

There are over 80 standard machines in the Cincinnati Press Brake line, ranging in length from 4′ to 20′ between the housings. 15 different tonnage capacities are available. Although they differ widely in size and capacity, they all have one feature in common . . . ***accuracy.***

This isn't an unsupported claim. The accuracy of the thousands of Cincinnati Press Brakes in operation has been time-proven . . . just check the production record of any one of them. A few of the features which contribute to this accuracy are:

- All-Steel, interlocked construction—no welds used as load supports, yet the bed is directly supported by the housings.
- Centerline loading—no weaving of the frame, since forces are contained within the housings.
- Deep beds and rams—depth in these members means rigidity, and rigidity means accuracy.

Write Dep't. A for Catalog B-5.



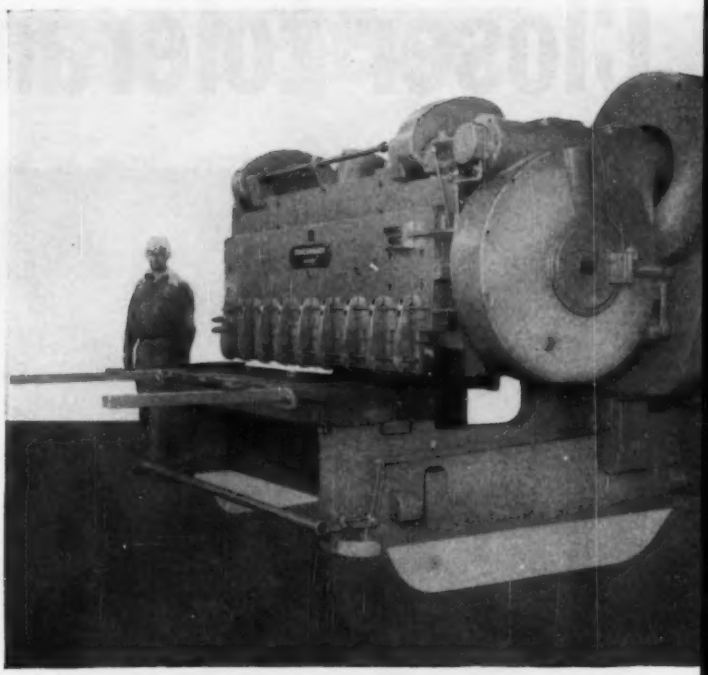
## AND . . . . PRESS BRAKE DIES

A 4-way die, equal to 4 V-dies, is shown in No. 1. No. 2 shows culvert sections being formed in repeat hits. Roof decking is made with the dies shown in No. 3.

No. 4 shows a punching setup with gags. The progressive setup in No. 5 does punching and drawing. The progressive setup in No. 6 makes refrigerator top parts.

We are prepared to design and furnish the tooling needed to convert your ideas into finished products. A background of 30 years of experience is represented in our Application Engineering Department, in literally every field associated with our machines. The photos at the left show just a few examples. For complete information, write Dep't. A for Catalog D-2.

# CINCINNATI SHEARS

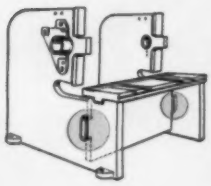


Cincinnati All-Steel Shears combine micrometer accuracy with high speed operation. Straight and parallel cuts are consistently produced, so accurately that only a micrometer can detect any variation in width of the sheared piece.

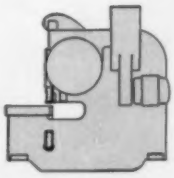
This accuracy doesn't call for special skill or manipulation on the part of the operator. As a matter of fact, Cincinnati Shears are built to cut all thicknesses, from thin material up to capacity, ***without changing knife clearance.*** This prevents accidental damage and eliminates interruptions in production.

Dependability, equally important, is insured by Cincinnati interlocked construction. No welds are used as load supports, yet the bed is directly supported by the housings. All-steel frame members minimize deflection.

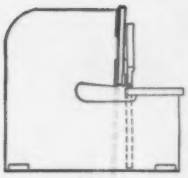
The sketches below show a few important features. For full information, write Dep't. A for Catalog S-7R.



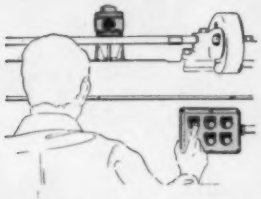
Interlocked construction means no welds used as load supports



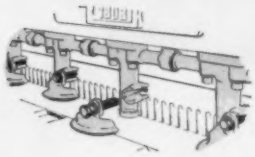
Gap frames allow shearing pieces longer than the machine



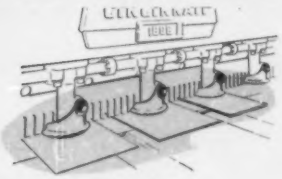
Inclined ram offsets the thrust caused by shearing action.



Front-controlled power back gauge is accurate, fast, convenient.



Hydraulic holdowns exert tons of pressure, insure accuracy.



Different gauges, held with same tonnage, can be cut together.

## THE CINCINNATI SHAPER CO.

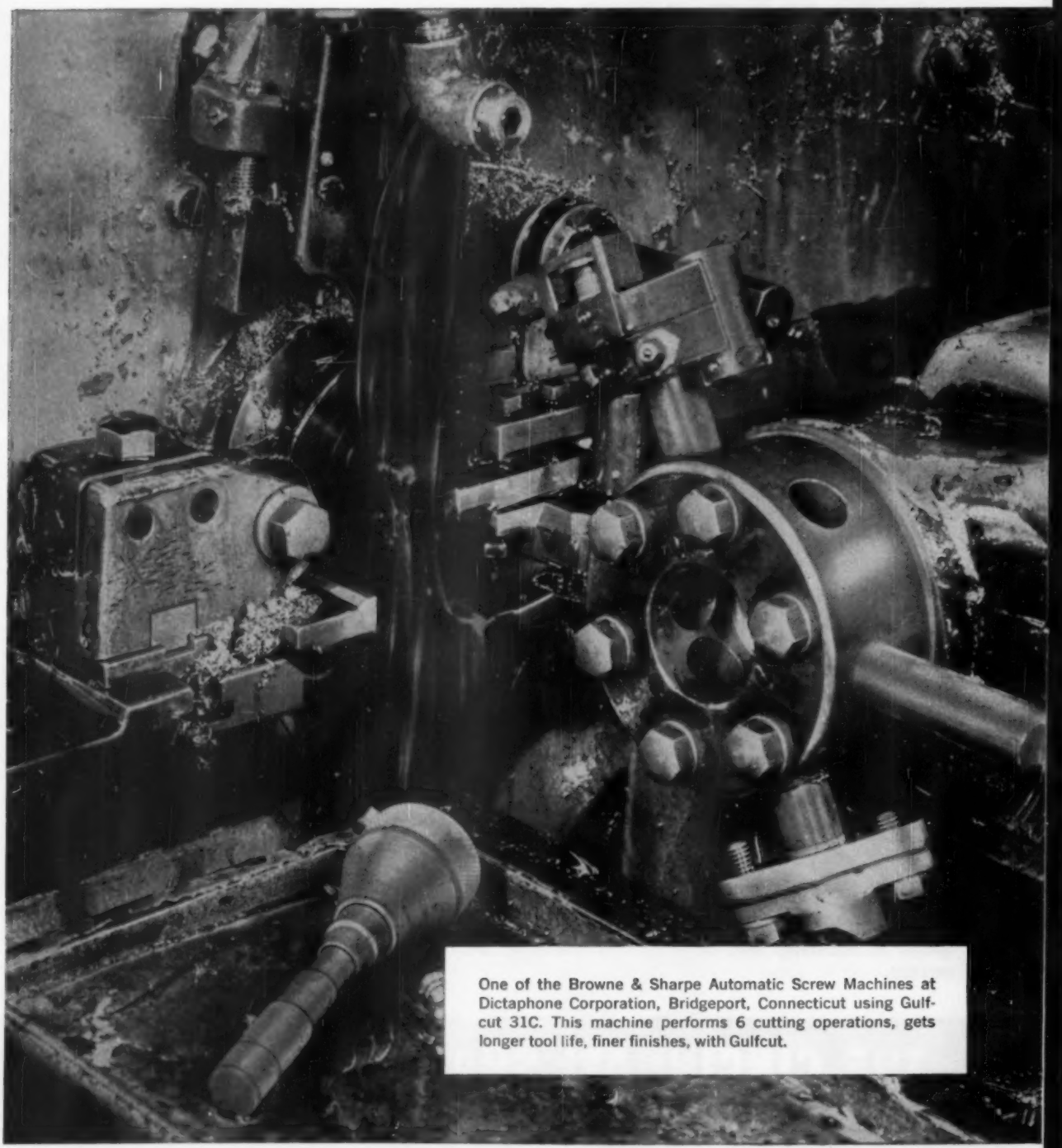
CINCINNATI 25, OHIO, U.S.A. SHAPERS · SHEARS · PRESS BRAKES

CINCINNATI

punching and drawing. The progressive setup in No. 6 makes refrigerator top parts.

## At Dictaphone Corporation, Bridgeport, Connecticut...

# Closer tolerances, better



One of the Browne & Sharpe Automatic Screw Machines at Dictaphone Corporation, Bridgeport, Connecticut using Gulfcut 31C. This machine performs 6 cutting operations, gets longer tool life, finer finishes, with Gulfcut.

# finishes, fewer rejects ...with GULFCUT!

Dictaphone has used Gulfcut 31C since Gulf first introduced this cutting oil—has used it exclusively for the past 10 years. On brass, bronze, aluminum, or any of the several types of steel used in manufacturing precision parts for Dictaphone Machines . . . *one* cutting oil, Gulfcut, does the job!

Says Joseph A. Maloney, Process Engineer: "Day in, day out, our machines are producing fine quality work, using Gulfcut. We get steady production at an even rate—hold tolerances as close as 3 ten thousandths. Gulfcut 31C provides the necessary combination of lubrication and cooling that leads to longer tool life, better finishes, with fewer rejects."

Whether you need a mineral-lard oil, a sulfurized-mineral oil, a sulfurized-mineral-lard oil, a sulfo-chlorinated-lard oil, or an emulsifying oil (the Gulfcut line includes all of these) . . . call your Gulf Sales Engineer. He will be glad to recommend the proper cutting oils for *your specific needs.*

Joseph A. Maloney, Process Engineer at Dictaphone, and J. A. Magill, Gulf Sales Engineer, observing Gulfcut 31C at work on precision parts. Gulfcut cutting oils excel over a wide range of cutting applications . . . help to reduce machining costs.

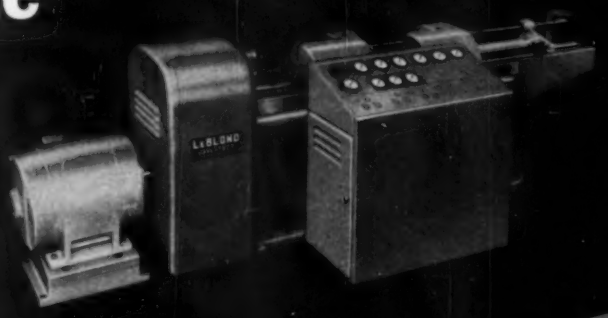
**GULF OIL CORPORATION**

1822 Gulf Building, Pittsburgh 30, Pa.

GULF

**THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS**

# Find out whether this new machine will bore your parts 3 to 8 times faster!




**Parts with long holes . . . or identical parts,**

*The new LeBlond-Carlstedt Rapid Borers* solid bore, trepan or counterbore holes 3 to 8 times faster than by the conventional D-bit method! *Hole capacity from 5/16" to 4-1/4" diameter.* Basically, the Rapid Borer is suited to work that is symmetrical for balance in rotation—round, square, octagonal, tapered or stepped. A wide variety of hole diameters and depths as well as work sizes can be handled.

The Rapid Borer was developed expressly to accommodate revolutionary new tooling which cuts at very high speed with good accuracy and finish. Cutting oil at high pressure is forced between the boring bar and hole wall forming a continuous bearing. It flushes back through a hole in the boring head and bar, carrying away the chips as it goes. Chip form is controlled both by tool angles and proper feed and speed combinations; thus tool faces are kept clean and chip passage clear. Cutter design produces balanced cutting pressures thereby controlling concentricity.

This new tooling requires a machine with the following characteristics, all of which are incorporated in the LeBlond Rapid Borer design—High spindle horsepower; Ample rigidity throughout; Complete absence of vibration at all speeds; Infinitely-variable feeds, independent of speeds, while running under load; Final drive to spindle through belts; Large volume of cutting oil. Available in 3 sizes, No. 15, No. 30 and No. 60.

*Tell us about the holes you'd like to produce faster.* Large holes or small. If the Rapid Borer can handle the job, we'll show you how to produce them faster than ever before. Other equipment available for holes larger than 4¼".

THE R. K. LEBLOND MACHINE TOOL COMPANY
Dept. A, Cincinnati 8, O.

Gentlemen:
We want to know if your Rapid Borer really will bore our part 3 to 8 times faster. Here's a description of the job.

*Size of hole to be bored*_____

*Length of hole to be bored*_____

*Annual production of parts*_____

*Material and Hardness*_____

*Conformation of part and dimensions (send sketch or print)*

Name_____

Title_____

Company_____

Address_____

City_____ State_____

# bored as one piece, then cut apart.

*These tremendous production savings can be yours!*

Rapid Borer Time: 5.2 minutes
D-Bit Time (old method): 41.5 minutes
*Hole diameter . . . 1-17/32"*
*Hole length . . . 31¼"*
*Part material . . . C-1141 Hot Rolled 187 Brinell*
*Part outside diameter . . . 2.450" at small end, 2.710" at large end.*
*Feed rate (solid bore) . . . 6" per minute*

Rapid Borer Time: 17.75 minutes
D-Bit Time (old method): 86 minutes
*Hole diameter . . . 2-3/16"  Core diameter . . . .852"*
*Hole length . . . 53¾"*
*Part material . . . 4140 Forging 200 Brinell*
*Part outside diameter . . . 3.455" at small end, 4.425" at large end.*
*Feed rate (trepanning) . . . 3" per minute*

For complete information write for Bulletin LC 502A

**THE R.K.LeBLOND MACHINE TOOL COMPANY**

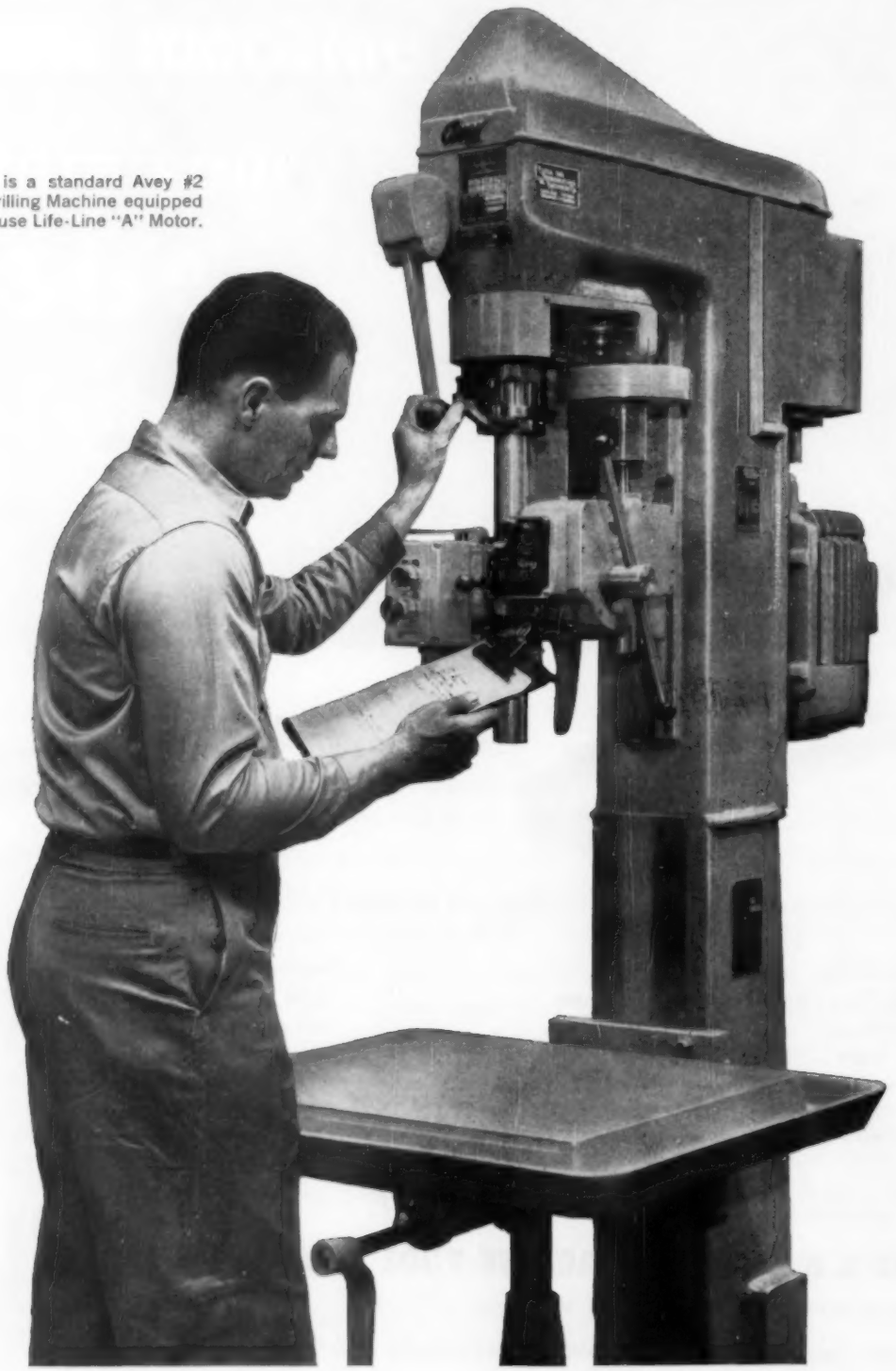
Cincinnati 8, Ohio

World's Largest Builder of a Complete Line of Lathes for more than 70 years

LeBLOND of Cincinnati

# Life-Line A motor-equipped BMA

Machine shown is a standard Avey #2 type "BMA-6" Drilling Machine equipped with a Westinghouse Life-Line "A" Motor.



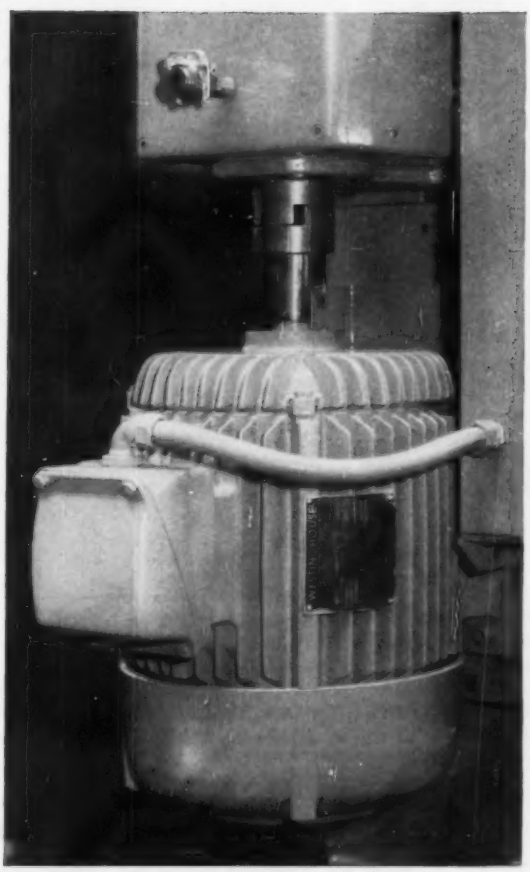
# drills reverse within 1/3 revolution ...make 40 reversals per minute

Westinghouse Life-Line "A" motors are used on Avey drills, manufactured by the Avey Drilling Company, Cincinnati, Ohio, for both tapping and drilling. Tests indicate that spindle reversals can be made within ⅓ revolution.

For machine tool applications, such as the Avey BMA—6 Drill, motor performance is critical. For high reversal duty and the ability to withstand momentary overloads, nothing can surpass the Life-Line "A." Superior insulation means superior performance—and the Life-Line "A" with Mylar slot cell, Bondar Wire, and Bondite Silicone impregnated varnish has the finest insulation of any standard motor on the market today.

You can POWER-UP for more profitable production with Life-Line "A" Motors. See your local Westinghouse sales engineer, or write Westinghouse Electric Corporation, P. O. Box 868, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

J-22046



YOU CAN BE SURE...IF IT'S

Westinghouse

# Up to 40% higher tightening torques keep a

## —and only the combination of an UNBRAKO screw

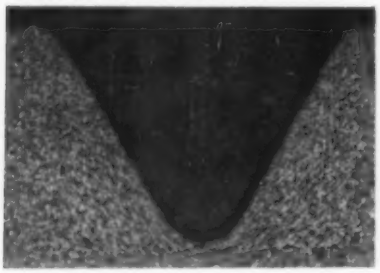
**RECOMMENDED SOCKET SET SCREW TIGHTENING TORQUES (Inch-Pounds)**

| SCREW SIZE | UNBRAKO | SET SCREW B | SET SCREW C | MINIMUM DIFFERENTIAL % |
|---|---|---|---|---|
| #4 | 5 | 3.9 | 3.5 | 28 |
| #5 | 9 | 7.8 | 7.4 | 15 |
| #6 | 9 | 7.8 | 7.4 | 15 |
| #8 | 20 | 14.7 | 14.5 | 36 |
| #10 | 33 | 26.5 | 25 | 25 |
| 1/4 | 87 | 62 | 60 | 40 |
| 5/16 | 165 | 122 | 125 | 32 |
| 3/8 | 290 | 198 | 225 | 29 |
| 7/16 | 430 | 309 | 350 | 23 |
| 1/2 | 620 | 460 | 500 | 24 |
| 5/8 | 1225 | 1106 | 1060 | 11 |
| 3/4 | 2125 | 1540 | 1800 | 18 |
| 7/8 | 5000 | 3660 | 4600 | 9 |
| 1 | 7000 | 5025 | 6500 | 8 |

The High-Torque UNBRAKO socket set screw is made to withstand the highest tightening torques ever used to seat a set screw—up to 40% higher than an ordinary set screw. But to take full advantage of this UNBRAKO feature you must have a key that can apply the force required to seat it without damaging the screw or snapping the key. The High-Titan UNBRAKO hex key is designed specifically to set a High-Torque UNBRAKO so that you can be assured of full *high-torque* performance every time.

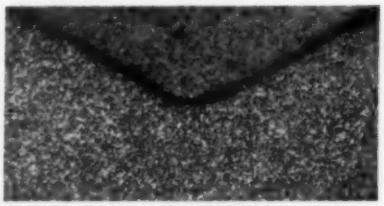
### Here's why a High-Torque UNBRAKO can be seated tighter—and stay put

UNBRAKO SET SCREW



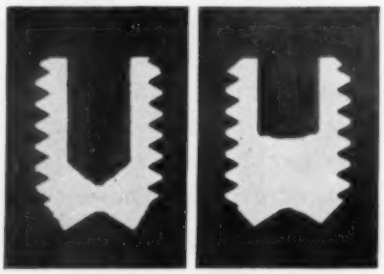
It has fully formed threads that make the whole screw stronger. The metal is compressed into the closely knit grain structure that you see in this illustration. The grain flow follows the contour of the threads. There are no straight lines along which shear can occur. The UNBRAKO retains its flow lines even when ground down to .010 in. below root diameter. Screws with cut or ground threads lose thread form at root diameter.

UNBRAKO SET SCREW



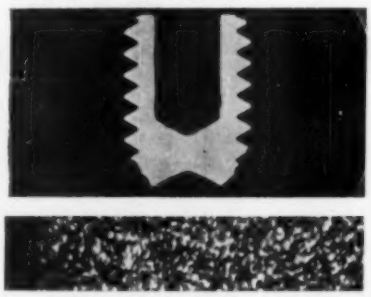
The High-Torque UNBRAKO has a radius in the socket corners. This eliminates the sharp corners where cracks start. It also distributes the stresses developed when tightening torques are applied. Ordinary socket screws have sharp corners which often crack when tightened even at lower torques than those recommended for UNBRAKO.

UNBRAKO SET SCREW | ORDINARY SET SCREW



The High-Torque UNBRAKO has a deeper socket, which gives you more purchase with the wrench. Since more wrench can be put into the UNBRAKO socket, you can set the screw much tighter. And you won't ream the socket or round the corners of the wrench.

UNBRAKO SET SCREW

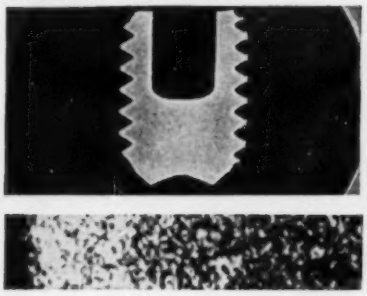


The High-Torque UNBRAKO is properly heat treated, kept clean. Its grain structure is uniform. It is free of decarburization. There's no danger of stripping the threads or shearing the point when tightening

# High-Torque UNBRAKO socket set screw tight

## and key assures full *high-torque* performance

**ORDINARY SET SCREW**



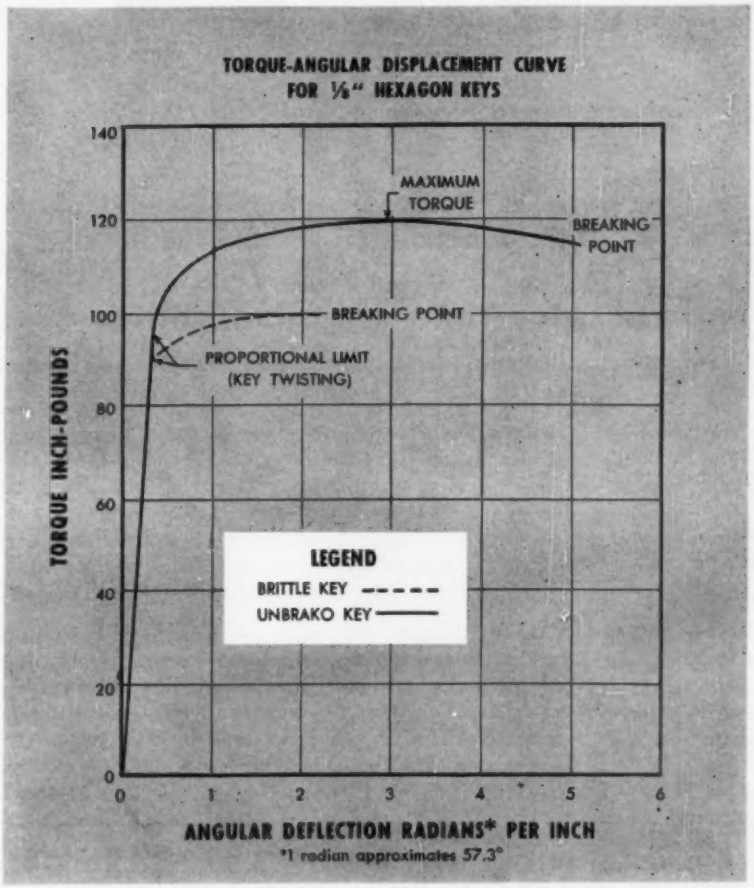
torques are applied. The ordinary screw is suffering from an overdose of decarburization; socket walls, threads and point are full of the telltale white spots that identify it.

And here's why an UNBRAKO High-Titan hex key can be used to apply far more tightening torque to a High-Torque UNBRAKO socket set screw than is needed without damaging either the screw or the key.

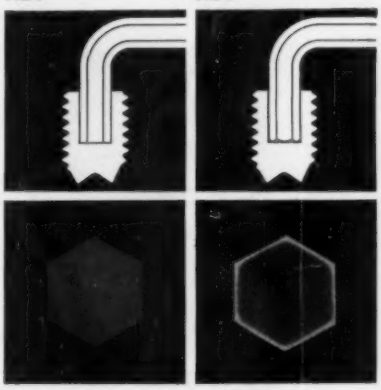
The High-Titan UNBRAKO is not an ordinary hex key. It is a precision internal wrenching tool with high ductility, specially designed to assure full high-torque performance. It is made of special alloy steel bar stock, inspected magnetically and chemically to make sure that the material is flawless and of the specified properties.

Its sides are flat and parallel. The corners, which exert torque on the inner walls of the socket, are sharp and tough. The bend is strong.

The High-Titan UNBRAKO is accurately sized across the flats and across the corners to insure snug fit and full wall contact. It won't ream or wear an UNBRAKO socket. The square cut end engages the full depth of the socket for greater tightening power. It gives you up to 25% more wrench engagement than a key with a chamfered end.




**UNBRAKO KEY** **CHAMFERED END KEY**



The High-Titan UNBRAKO hex key is heat treated in modern atmosphere-controlled furnaces. The surface is casehardened without decarburization. The extra hard surface gives the key longer life. And it retains its dimensional accuracy, is tougher and more ductile than ordinary keys. This torque-angular displacement curve for 1/8 in. hexagon keys distinguishes a High-Titan UNBRAKO from an ordinary key. The High-Titan UNBRAKO has a higher yield point and a higher breaking point—you can exert a much higher torque with it without snapping the key.

Be sure you get the full high-torque performance offered only by the combination of a High-Torque UNBRAKO socket set screw and a High-Titan UNBRAKO hex key. Both products are stocked by authorized industrial distributors. Ask the one nearest you for complete information. Or write STANDARD PRESSED STEEL CO., Jenkintown 1, Pa.

**We also manufacture precision titanium fasteners. Write for free booklet.**

**Unbrako Socket Screw Division** **SPS** **Jenkintown 1, Pennsylvania**

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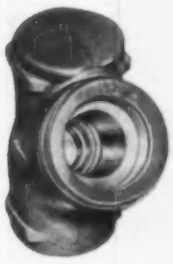

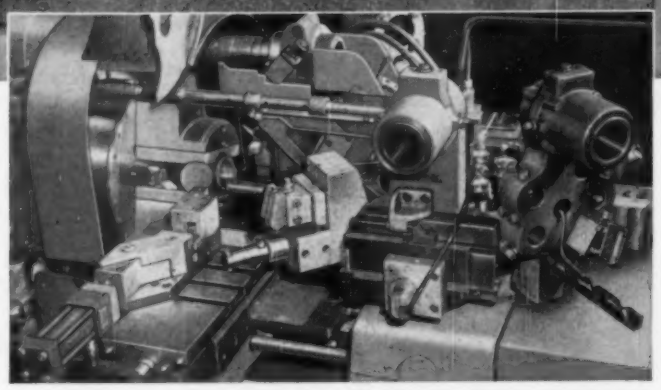

## Edward Valves Div. cuts setup time on valve bodies

**takes advantage of electric setup control panel, octagonal turret, JETracer on Gisholt Fastermatic**

You may spot production ideas in the way Edward Valves Division of Rockwell Manufacturing Company, East Chicago, Indiana, is increasing production of 1½" steel Univalve bodies.

A new Gisholt MASTERLINE 2F Fastermatic Automatic Turret Lathe is doing the job. With the Fastermatic's electric setup control panel, the operator preselects all important machine functions—including low spindle speeds for forming and threading, and high speeds for other operations. And with the Gisholt JETracer slide tool mounted on an 8-sided turret, a maximum number of surfaces are machined in a single chucking—with greater accuracy, finer finish and with more consistent quality.

Parts are held in an 18" 2-jaw hydraulically operated chuck. Automatic positioning at the end of each cycle speeds loading and unloading. Once the automatic cycle starts, turret tools drill, turn, face, form, relieve, chamfer, bore and thread. Cross slide tools face and chamfer. Critical internal diameters are finished to a high degree of accuracy, using turret-mounted JETracer slide tool.

Like to hear the facts on how the Fastermatic lets you utilize smart tooling...eliminate human errors...get record production on long runs, automatic cycle operating advantages on short runs? Contact your Gisholt Representative. He has the facts, and his wide experience may suggest new methods to improve your profit picture.

MASTERLINE GISHOLT SINCE 1887 GISHOLT

**GISHOLT MACHINE COMPANY**

Madison 10, Wisconsin, U.S.A.

**WRITE GISHOLT TODAY** for advance data on the new Gisholt MASTERLINE Fastermatic Automatic Turret Lathe. Ask for Bulletin No. 1179.

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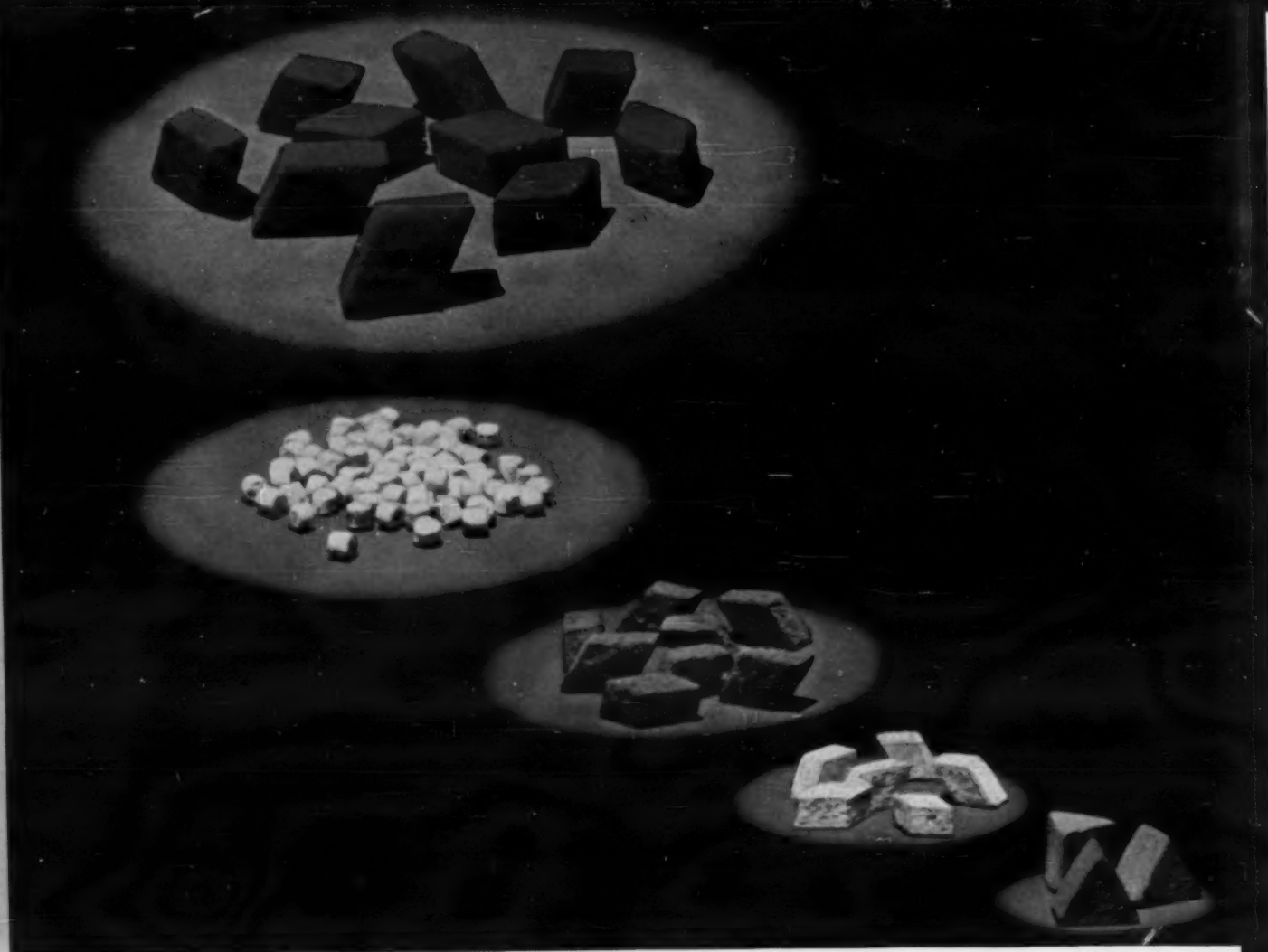

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**CARBORUNDUM** ... also makers of a complete line of Bonded and Coated abrasives

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## WRENCHES

## Types and Sizes for Every Industrial Use

ARMSTRONG Wrenches have engineered designs, a wide safety factor of extra strength, accurately machined openings that go over screw heads or nuts easily, grip firmly —will not slip, round corners or mar faces.

Drop forged from special high tensile carbon and alloy steels, heat treated to an exactly pre-determined balance of hardness, toughness and tensile strength. ARMSTRONG Wrenches will not "chew out," will stand up through years of service, making work faster, easier and safer.

In sizes and types, ARMSTRONG Wrenches comprise the most complete line of industrial wrenches manufactured. Specify "ARMSTRONG" when ordering wrenches.

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- wrap-around crown
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## NIAGARA 30 AND 50 TON PRESS BRAKES*

**HERE'S MEANINGFUL STREAMLINING** . . . and at its very best! *Everything's inboard:* Motor, belts, flywheel, clutch, brake and gears . . . yes, even the connections, pitmans and ram adjustment mechanism. *Nothing protrudes!*

Resourceful designing has made it possible to provide heavier, deeper uprights with relatively no increase in floor space. Net result: A 50% deeper throat for larger work.

**HERE'S PERFORMANCE** that can't be matched! These all-new Niagara Press Brakes have a smoothness of action all their own. Niagara Power Features . . . Power Clutch, Power Brake, Power Treadle . . . assure easy, instant response to every command. The ram can be micro-jogged smoothly and softly to a layout line, or stopped on a dime at full speed!

Proved on mighty Niagara Presses, Niagara's Electro-Pneumatic Friction Clutch engages in a fraction of a second, disengages even faster, and *fails safe!* Featuring simplified construction, it's a low inertia, heavy duty unit that's designed to outperform and outlast any other press brake clutch. Friction plates automatically compensate for wear . . . no adjustment required.

Spring applied, Niagara's powerful Air Releasing Brake can't fail for it does not depend on energy (air or electricity) to bring the machine to an immediate halt.

**HERE'S RUGGEDNESS** to take extreme loads in stride! Niagara's solid, all-welded steel one-piece frame with integral wrap-around crown provides maximum resistance to deflection. *There's nothing to work loose!* Utmost strength and rigidity are assured.

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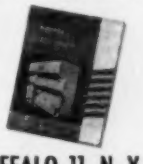
Find out what they can do for you by writing for Niagara's new, illustrated Bulletin 90 today.



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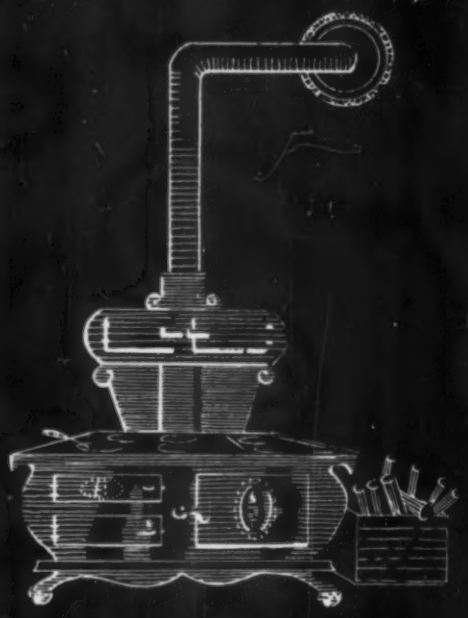

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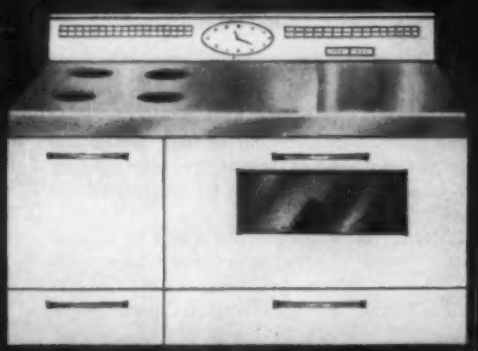

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# "Job Tempered"

**HAND and POWER**

# Hack Saws

*Certified by American Standards Testing Bureau* to meet their standards for superior cutting — Uniform Teeth... Uniform Set... Uniform Temper*

## FROM Heller

Now you can cut all kinds of metal faster *and* cheaper . . . with hand or power hack saws . . . thanks to Heller's great new advance in tool technology — JOB TEMPERING.

Controlled-analysis steel is specially selected to strict Heller specifications, then Heller uses its own *unique* heat treating method to bring every blade to the precise hardness and temper to accomplish the class of work for which it is intended.

The result: JOB TEMPERED hand and power hack saw blades perform better and last longer on the toughest cutting jobs.

Based on this new development, every Heller blade is certified by American Standards Testing Bureau* to meet the three vital requirements for superior metal cutting — *Uniform Teeth, Uniform Set and Uniform Temper.*

You can choose the right JOB TEMPERED Blade from Heller's complete line. And if your sawing problem involves economy as well as the proper use of power hack saw blades, a HELOMETER will help prolong blade life, improve cutting and speed set-ups by showing you when blade tension is precisely correct.

# *Big Benefits in the Heller Line of "Job Tempered" Hack Saw Blades*

## GIVE US YOUR TOUGHEST HACK SAWING PROBLEMS

We'll show you how the *right* Heller JOB TEMPERED Blade can solve it efficiently and economically — delivering faster, smoother, trouble-free cutting over longer periods than ever before.

## HERE ARE THE FACTS!

New Heller Hack Saw Catalog gives full information on sizes and types offered . . . shows why Heller JOB TEMPERED Blades, backed by the American Standards Testing Bureau*, are best in job performance.

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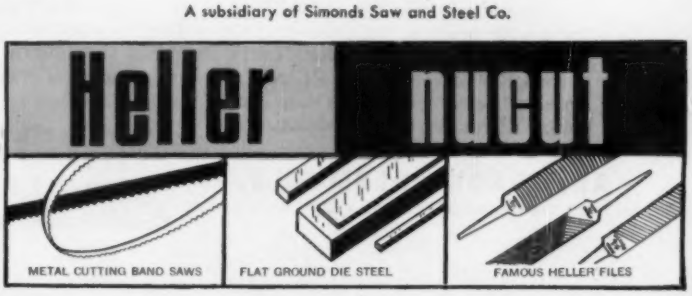


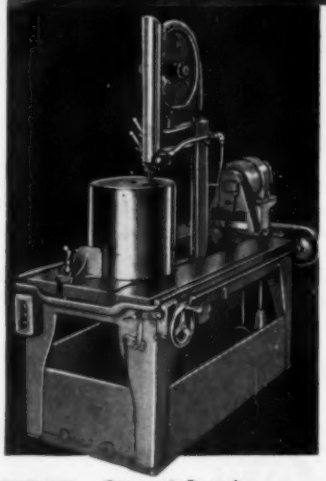
# MARVEL NO. 8 BAND SAW makes a tough job EASY...

## FLOOR TO FLOOR IN 5 HOURS... no special jigs, fixtures or set-up required

The versatility, simplicity of operation and unmatched efficiency of a MARVEL No. 8 Universal Metal Cutting Band Saw makes it the best all-around saw you can buy.

Take the job illustrated, as an example. Three equally spaced re-entrant cuts were required to segment a large, heavy die forging. The work was merely placed on the table between the vise jaws with the first lay-out line positioned to bisect the blade. Feed pressure was set on the direct-reading scale and the cut started. On a MARVEL No. 8, the work is always stationary and the blade is fed into the work; the cutting edge of the blade is always square with the table throughout its full feed traverse, which eliminates the need for special fixtures. The pre-set Automatic Overload-Relief Power Feed kept the blade moving into the work only as fast as it could freely remove the metal; as the vertical length of the cut decreased, the blade was automatically fed faster, thus increasing cutting speed. Upon completion of a cut, the blade was rapidly returned to its starting position by a rapid traverse handwheel located at the operator's position. Succeeding cuts were made in the same manner, with the same ease and speed.

Jobs like this aren't done every day, but they serve to emphasize the versatility of the MARVEL No. 8, a truly universal metal cutting saw. If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.



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MARVEL Metal Cutting SAWS
Better Machines–Better Blades

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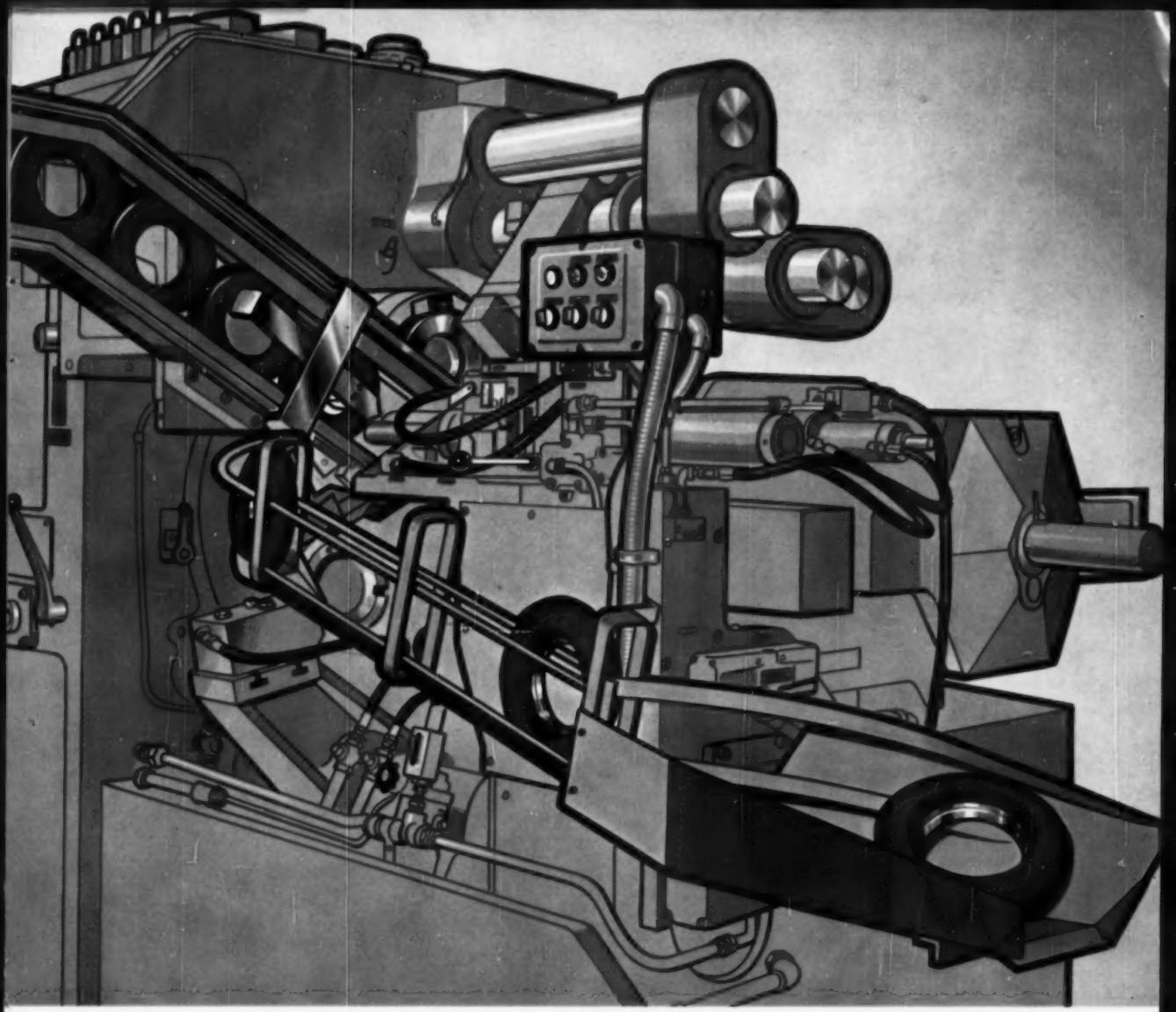
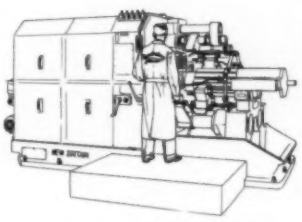


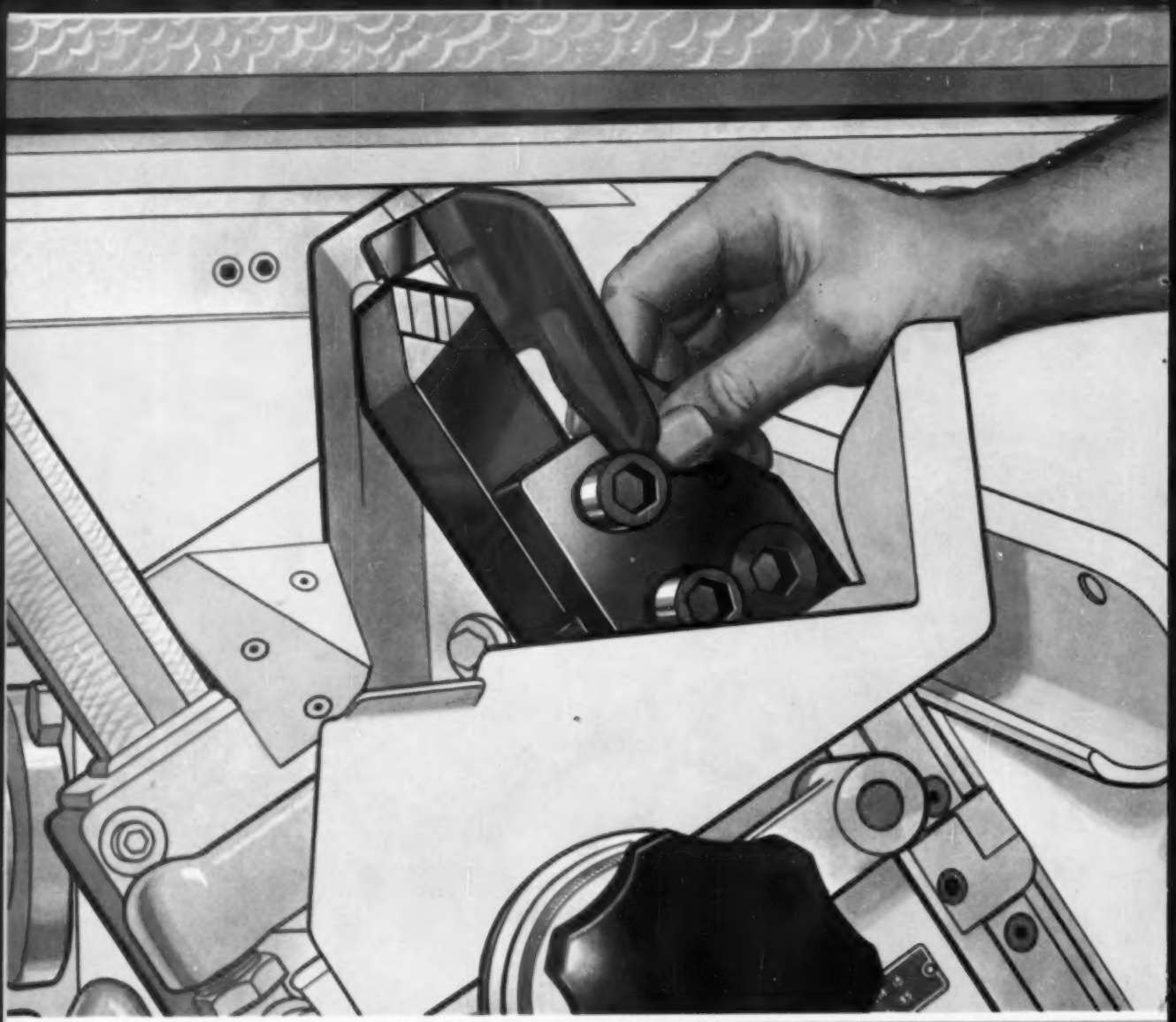
# get more chucker work done

# with automatic "handling"

New Britain chuckers are the time-tested leaders in their field. Their basic open-end design, an exclusive New Britain feature, makes them unusually well adapted to the automatic handling of pieces. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.



Automatic Chucking Machine

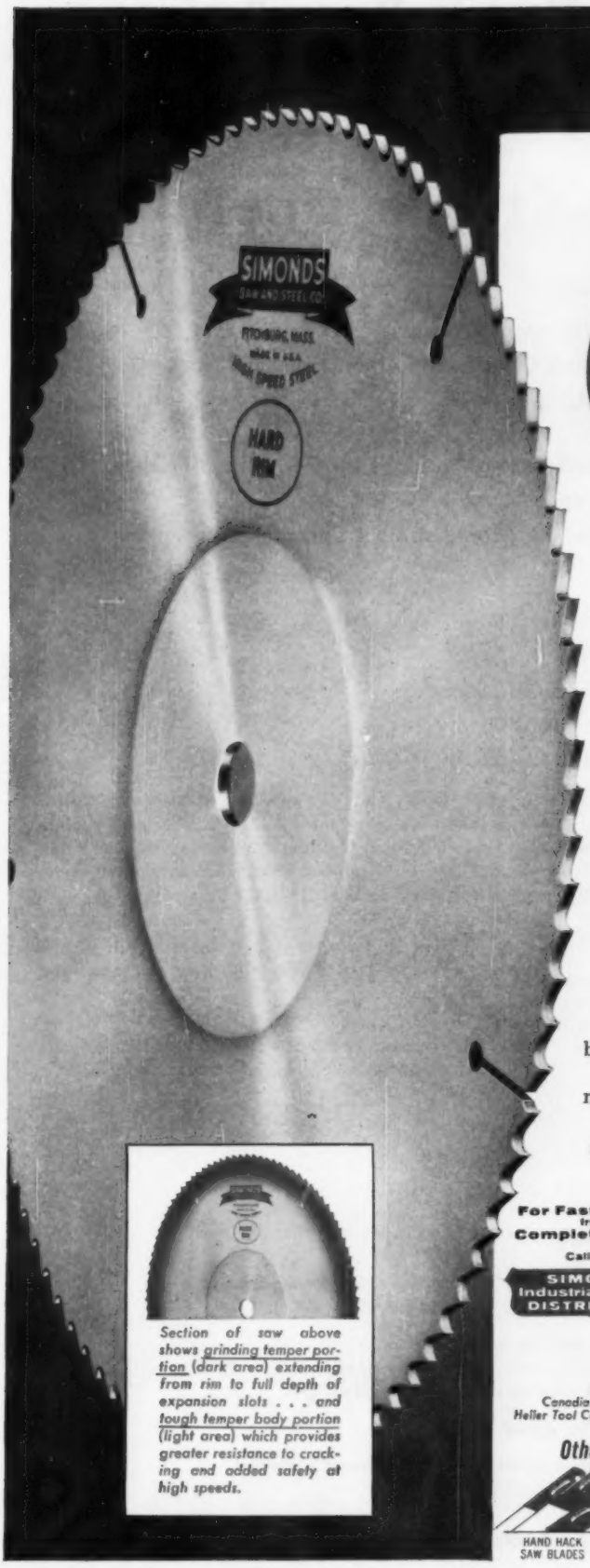


# 1-minute tool change gets more contour work done

It's a fact — you can do more work in a day with a New Britain +GF+ copying lathe and a single-point tool, than with a conventional lathe using half a dozen. Just slip out the worn tool, slip in a new one, gauge it to a single dimension and you're ready to go again. The template repeats the dimensions. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.

New Britain +GF+ Copying Lathe

# NEW!






*Section of saw above shows grinding temper portion (dark area) extending from rim to full depth of expansion slots . . . and tough temper body portion (light area) which provides greater resistance to cracking and added safety at high speeds.*

# SIMONDS HARD RIM SAW

- **Longer Cutting Life**
- **Maximum Safety**
- **Minimum Kerf**

Here's Simonds *newest* — a solid saw that offers longer cutting life and greater safety similar to Simonds Inserted Tooth or Segmental Saws. Specifically, it provides increased cutting life between sharpenings . . . decreased breakage at high speeds . . . and less kerf (as compared to non-solid saws). The saw *rim* is made extremely hard for tremendous resistance to abrasion and wear — the saw *body* is made just hard enough for true cutting of non-ferrous metals and plastics on all types of machines.

Simonds "Hard Rims" will produce a better finish because the solid tooth design cuts truer . . . you can safely run 'em at higher speeds because they will not shatter. And they can repeatedly be resharpened on standard saw grinding equipment. When you get yourself a Simonds "Hard Rim" (8″ to 18″ dia.), you've got yourself a SAW, brother!

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## Another MINSTER First in Press Design Operating in Production Lines Since 1953 Has Proved That You *Can* Get

# More Single Stroke Operations

The exclusive "hidden value" in the Minster MS2 press is Minster's patented Intermediate Shaft Combination Air Friction Clutch and Brake Drive arrangement.

This drive arrangement makes it possible to get a higher single stroke efficiency, based upon rated continuous press speed, and the widest speed selection ever available on large double geared straight side presses.

### Here's what this exclusive Minster feature can mean to you

- More production on manually fed or automated presses.
- Faster starting and stopping . . . more single stroke operations per minute.
- Less flywheel energy loss . . . lower power consumption.
- Reduced clutch wear . . . less maintenance and adjustment.
- You may select either the faster speeds of a conventional single geared machine or the slower speeds of a double geared press. Two-speed drive (optional) allows selection of a speed to fit different type operations.

### How it works:

MS2 presses are double geared and have twin drive gears on the crankshaft. Minster's patented Combination Air Friction Clutch and Brake unit is mounted on a slower turning *intermediate shaft* instead of within the flywheel on the high speed drive shaft.

This means lower contact speed of clutch friction surfaces, resulting in very little heat on linings and less wear.

Flywheel can be run at maximum RPM for maximum energy without limiting speed of operations.

### Additional Minster MS2 Press Features

Minster Recirculating Oil Lubrication system provides continuous oil film on all bearing surfaces . . . allows closer bearing and gib clearances for reduced lash and better slide guiding.

All air, lubrication and electrical systems are complete, enclosed within the press frame line, yet easily accessible. Electrical circuits and pneumatic systems for manual or automated production. Controls mounted within cabinet type uprights.

Massive, box type, four-piece tie rod frame for rigidity.

Precise slide to bed parallelism. Slide fully guided within gibs before midstroke is reached.

Outboard drive sheave for easy belt changing.

All wear surfaces bronze-lined, precision fitted and replaceable.

## Per Minute

# MINSTER®
## MS2 Presses

**150 TO 500 TON CAPACITIES**

in five widths R to L in each capacity—two F to B dimensions in each capacity.

Dimensions meet J.I.C. Standards

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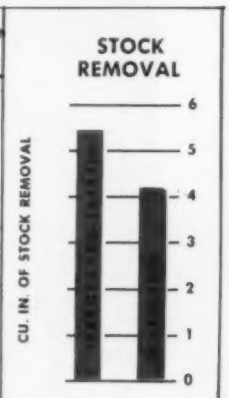
## PROVED BY INDEPENDENT LABORATORY TESTS:

# 31.7% S·M·I*

## for FERROCARBO®-TREATED IRON

| CHEMICAL ANALYSES | UNTREATED | FERROCARBO® TREATED |
|---|---|---|
| TC | 3.51 | 3.50 |
| Si | 1.96 | 1.99 |
| P | 0.17 | 0.17 |
| CE | 4.16 | 4.16 |
| Cutting speed (ft./min.) | 210 | 210 |
| Feed (in./rev.) | .009 | .009 |
| Depth of cut (in.) | .062 | .062 |
| Wear Land (in.) | .005 | .005 |
| Vol. of metal removed (cu. in.) | 4.1 | 5.4 |
| Per Cent Improvement | | 31.7% |




* Surface Machinability Improvement
Tool wear tests were conducted with a single point "Carboloy" grade 44A tool on castings machined at commercial speeds. Flank wear was measured with a 20 power microscope.

***These extraordinary test results were obtained by an independent research laboratory on unalloyed gray iron cast by a leading Midwest foundry, using untreated and Ferrocarbo-treated iron of identical chemistry.***

Castings that are *easier* to machine are *easier* to sell. That's why FERROCARBO Briquettes—the unique patented cupola additive by Carborundum—are used by outstanding foundries everywhere. Tests conducted on FERROCARBO-treated gray iron manufactured by leading foundries all over the country show a machinability improvement factor as high as 73% over untreated gray iron. Now, *premium* castings are assured at *no extra cost.* LOOK INTO FERROCARBO TODAY!

**WRITE FOR MORE INFORMATION** on how FERROCARBO produces more machinable iron regardless of metal composition. Ask for booklet A-1409, Electro Minerals Division, The Carborundum Company, Niagara Falls, N. Y.

*ELECTRO MINERALS DIVISION*

**The CARBORUNDUM Company**

REGISTERED TRADE MARK

**FERROCARBO DISTRIBUTORS—KERCHNER, MARSHALL & CO.,** PITTSBURGH • Cleveland • Buffalo • Philadelphia • Birmingham • Los Angeles • Canada
**MILLER & COMPANY,** CHICAGO • St. Louis • Cincinnati

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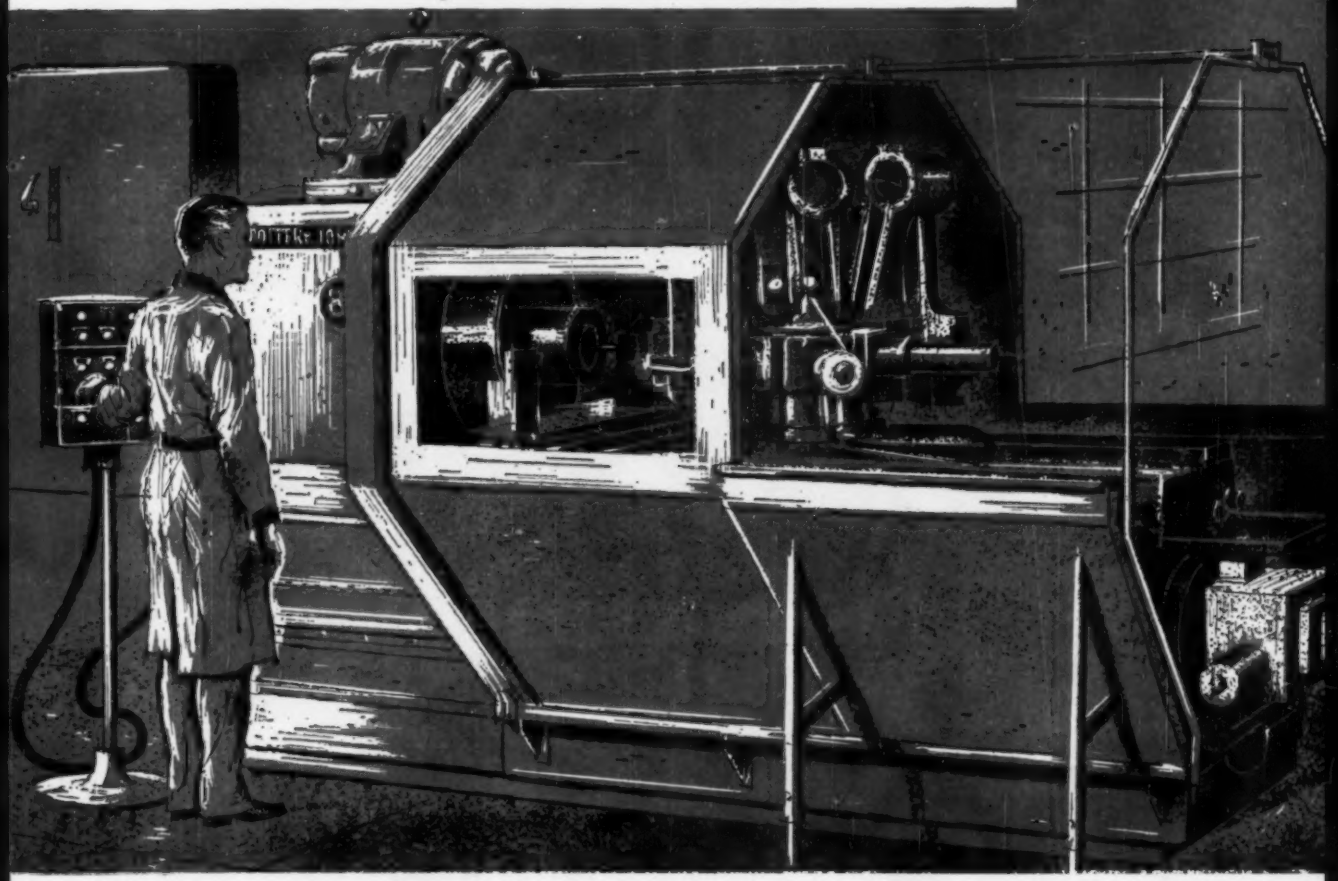
*Here it is . . . . the machine industry's been asking for !**

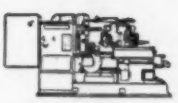


# THE NEW P&J 8-U

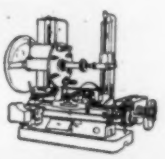
## AUTOMATIC Turret Lathe

***A MACHINE TO FILL THE GAP BETWEEN OUR 6 DREL-40 AND 10-U**

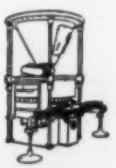
Here is a new automatic with the extra power, rigidity and capacity you may be looking for. It's designed and engineered to handle your really big, hard-to-machine jobs faster, better and more economically than ever before. It will hog out tough alloys in a hurry, hold close tolerances and produce fine finishes with speed and efficiency. The 8-U with 50 hp, 30″ chuck and 40″ swing is intermediate in size between our 6 DREL-40 and 10-U. Take a minute now to write for specification circular and see how the new P&J 8-U fits into your production schedules.
Potter & Johnston Company, Pawtucket, Rhode Island.



AUTOMATIC TURRET LATHES



GEAR CUTTERS



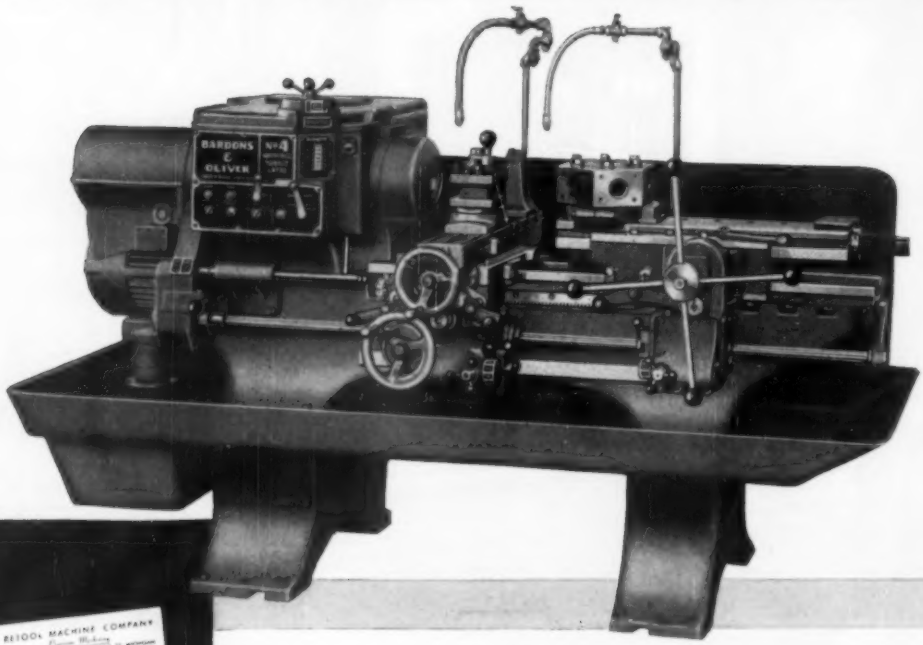
GILDA PACKAGING MACHINES

**POTTER & JOHNSTON**

*SUBSIDIARY OF PRATT & WHITNEY COMPANY, INC.*

**PRECISION PRODUCTION TOOLING SINCE 1898**

# RETOOL MACHINE COMPANY
## *selects the* BARDONS & OLIVER No. 4 *Universal Turret Lathe because* of its *ACCURACY & VERSATILITY*



RETOOL MACHINE COMPANY

Mr. Olaf Nilson, owner of Retool Machine Company, Detroit, Michigan, has this to say about the No. 4 Universal Turret Lathe: **"We specialize in close-tolerance, aircraft-quality machining. The unpredictable nature of our work requires the utmost in accuracy and versatility from our machine tools.**

**Last year, after careful study, we ordered a Bardons & Oliver No. 4 Universal Turret Lathe. This machine has now been in operation over six months, and its performance is even more favorable than anticipated.**

**With the wide range of 16 preselective speeds, plus a full 15 HP available at each speed, and with 12 feeds ranging from .0015" to .050", high productivity is attained on a larger variety of jobs and materials. Furthermore, the quality of finish and degree of accuracy are excellent. Our operators particularly appreciate your features contributing to quick set-up and easy operation.**

**The power and rigidity of your new No. 4 Universal Turret Lathe seems adequate to fully utilize any improvements in cutting tools which may develop in the lifetime of the machine."**

***Manufacturers of a complete line of Turret Lathes and Cutting-off Lathes***

# BARDONS & OLIVER, INC.

1134 WEST 9TH STREET • CLEVELAND 13, OHIO

# Another score for you . . . and Cimcool

You'll score many an inside-the-plant home run . . . increasing production and lowering costs . . . when you let CIMCOOL® go to bat for you. CIMCOOL Concentrate is the largest selling chemical cutting fluid in the world. Here's how this radically new and different cutting fluid can win for your production team!

**CIMCOOL LOWERS COSTS** because it's longer lasting in machines. Thus, it reduces downtime and cuts costs for cleaning and changing.

**CIMCOOL DOES A BETTER JOB** because of its chemical lubricity. It permits faster speeds and feeds, for it combines friction reduction and cooling capacity in a degree never before attained by old-fashioned coolants.

**CIMCOOL IS CLEAN,** doesn't soil clothing or hands. It contains no skin irritants. It leaves no slippery film on shoes, floor, machine or work. It can't smoke, can't burn, and virtually eliminates rancidity and foul odors.

Your CIMCOOL Distributor has valuable teamplay tips for you. He'll give you complete information on CIMCOOL Concentrate—and the entire family of CIMCOOL Cutting Fluids. Or contact us direct. We'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Write, wire or telephone Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

®Trade Mark Reg. U.S. Pat. Off.

## CIMCOOL CUTTING FLUIDS

CIMCOOL **Concentrate**—The famous pink fluid which still covers 85% of all metal cutting jobs. Effective, economical and clean.

CIMCOOL **Tapping Compound**—Permits the use of highest tapping speeds and increases tap life amazingly.

CIMPLUS The transparent grinding fluid with exceptional rust control. Also used for machining cast iron and as a water conditioner with CIMCOOL Concentrate.

CIMCUT **Concentrates** — For jobs requiring oil-base cutting fluids. Added to mineral oils, they give economical mixes for higher speeds and feeds.

CIMCOOL **Bactericide** — The most effective agent yet developed to overcome rancidity and foul odors.

CIMCOOL **Machine Cleaner** — The two-phase non-corrosive cleaner that removes grit, dirt, slime and oil.

# CIMCOOL Cutting Fluids

*for 100% of all metal cutting jobs*

PRODUCTION-PROVED PRODUCTS OF THE CINCINNATI MILLING MACHINE CO.

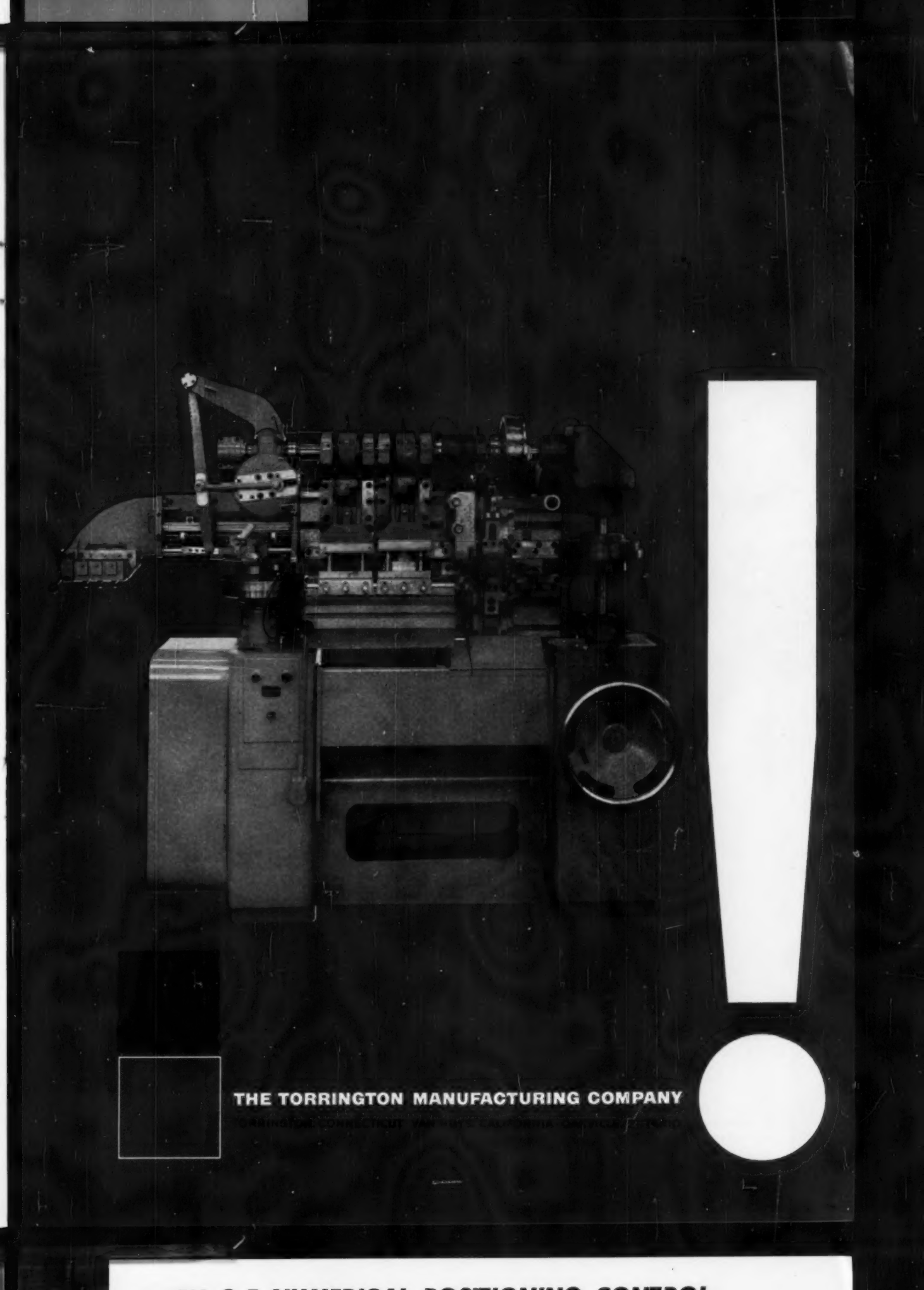
*A Great New* Vertical *4-Slide*

*The Torrington Verti-Slide!*

This important innovation in the basic field of 4-slide production equipment offers so many advanced design features, performance advantages and cost-cutting facilities that it is making national news as a development of major interest to U. S. industry.

## NATIONAL NEWS

For the Torrington *Verti-Slide* was designed to meet a fundamental need for greater versatility, lower tooling cost, faster set-up time and reduced floor space. We urge you to investigate the *Verti-Slide* in detail at the Metal Show, Booth 1567, or through direct communication with our Machine Division.



THE TORRINGTON MANUFACTURING COMPANY

**SUNDSTRAND MODEL 14 LATHE** is controlled by G-E numerical positioning control and punched card input. Lathe is used for general step-shaft turning, providing both roughing and finishing of shafts. Positioned drives include longitudinal motion of carriage and vertical cross slide. Auxiliary programmed functions include card-sequence check, spindle speed, carriage speed, cross-slide speed, facing-tool speed, tool indexing, and cycle interruption.

## *WITH G-E NUMERICAL POSITIONING CONTROL*

# Programs are prepared in 1/10 the time, parts produced 51% faster—automatically!

Production runs on Sundstrand Machine Tool Company's Model 14 lathe have again proved the superiority of G-E numerical positioning control. To compare the performance of a G-E numerically controlled lathe with a standard lathe, 20 different parts were run on each type. Here are a few of the actual production results:

- **Machine set-up time** is practically eliminated with G-E numerical positioning control.
- **Average machining time saving** is 51%—ranges to 83% on individual parts.
- **Cost of data preparation** is 10 times *less* with G-E numerical positioning control.
- **Program preparation time** is only *one-tenth* that of the standard lathe.
- **High accuracy** is maintained repeatedly with G-E numerical positioning control. Electrical system carriage accuracy: ±.0025; cross-slide accuracy: ±.0005.
- **Over-all production time** is less due to fully automatic operation of G-E control system.

These performance results add up to faster, more accurate production—automatically!

### WIDE RANGE OF APPLICATIONS

The amazing performance of General Electric numerical positioning control is not limited to lathe applications such as this. The G-E system can be applied to *any* machine which requires positioning of linear or rotary motion members from one point to the next. Thus, G-E numerical positioning control is applicable to many machines in metalworking, plastics, paper, textile, and woodworking industries.

### COMPLETE LINE OF PROGRAM CONTROLS

All types of programming have application in today's industry, and General Electric offers you a complete selection of job-proved systems to help you convert from manual control to automatic machine control.

In addition to numerical positioning control, General Electric leads in the design and application of template tracer and numerical contouring control systems.

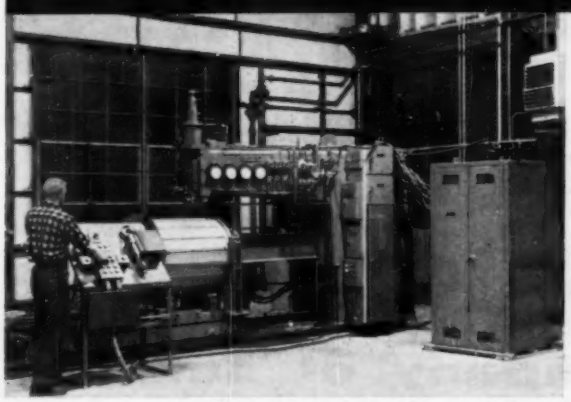
To learn more about how you can benefit from today's modern machines and machine tools controlled by General Electric program control systems, contact your G-E Sales Engineer today. And, for a complete description of G-E numerical positioning control, write to Section 795-1, General Electric Co., Schenectady, New York.

*Specialty Control Dept., Waynesboro, Virginia.*

*Progress Is Our Most Important Product*

**GENERAL ELECTRIC**

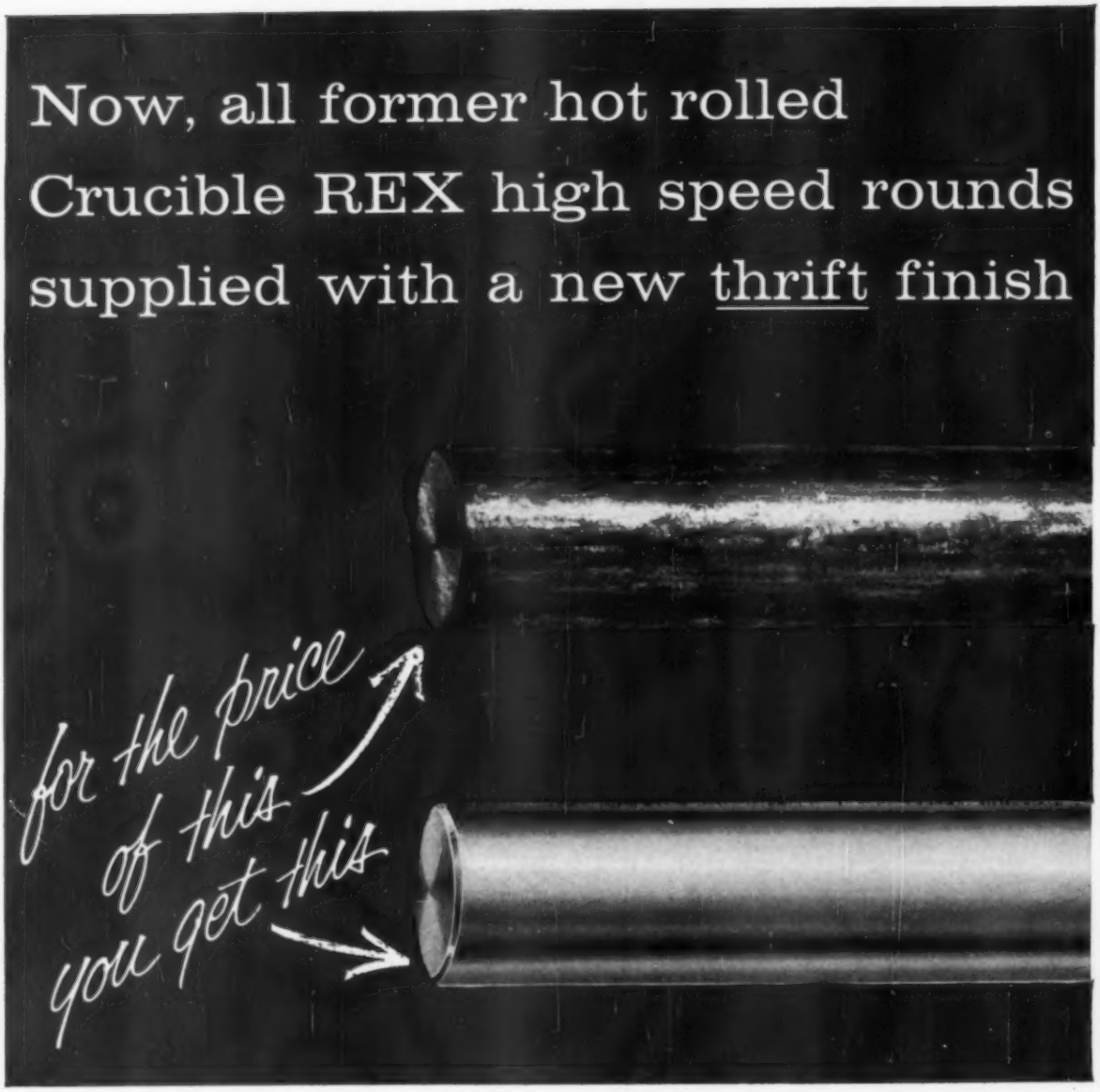
### 2 MORE APPLICATIONS OF G-E NUMERICAL POSITIONING CONTROL



Spot-welding machine

Turret-type punch press

# Now, all former hot rolled Crucible REX high speed rounds supplied with a new thrift finish




Here's a revolutionary, new Crucible policy designed to provide an improved product—save time and processing costs. Now, Crucible furnishes all REX® high speed rounds from ⅝" up with a machined surface, close to size and free from decarburization. All bars from ¼" to ⅝" round are supplied cold finished.

This new *thrift* finish means important savings to you – whether you've been paying extra for decarburization and stock removal, or grinding or rough turning rounds in your own shop. Of course, where extremely close tolerances are demanded, precise centerless grinding is still available at a small extra.

It's another Crucible "first" that offers you substantially more for your high speed steel dollar. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

**CRUCIBLE** first name in special purpose steels

**Crucible Steel Company of America**

Canadian Distributor—Railway & Power Engineering Corp., Ltd.

*Check...*

# COST-PER-PIECE

...it's usually LESS on the

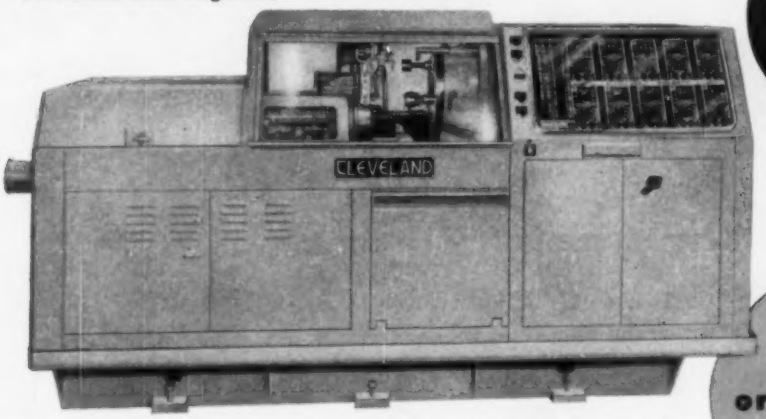
NEW 1⅜" or 1⅝" model AB

# CLEVELAND DIALMATIC

Analyze each of your jobs on its own. Figure it on a new 1⅜" or 1⅝" Model AB Cleveland Dialmatic single spindle automatic, and compare the best other methods you can use. Chances are you will get a much lower unit cost on the Cleveland—even on runs as small as 50 pieces!

Dial control is the answer. With this new Cleveland you save set-up time because there are *no change gears, no special cams to install.* You simply *set the dials* to pre-select any tool feed or spindle speed that you want, forward or reverse, for each of the five turret positions . . . the *exact* feeds and speeds for all types of tools, all kinds of metals. Then set the timing dogs and you are programmed for fully automatic machining—faster, more accurate production with fewer rejects.

Apply the many cost-cutting features of the new Model AB to your jobs. Get full information—write for the new 1⅜" and 1⅝" Model AB Cleveland Bulletin, or, better still, get in touch with a Cleveland sales engineer.




**ONLY the 1⅜" and 1⅝" Model AB CLEVELAND DIALMATICS provide—**

**EXACT SPINDLE SPEEDS**—infinitely variable between 40 and 3200 rpm. Automatic changes and reversals.

**EXACT TURRET FEEDS**—actually **tuned** to each cut. No cam changes with Cleveland's universal camming.

**OTHER PRODUCTIVITY FEATURES**—independently controlled front and rear cross slides . . . independent cutoff slide . . . easy handcrank adjustment of stock feed . . . quick-change collets and feedshells . . . only 6.3 second idle motion time . . . Geneva turret indexing mechanism . . . and a host of other design features which assure long-lived accuracy—low maintenance costs.

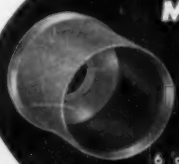
## STAINLESS?

TIP ⅛" diameter, #416 stainless steel. 107 pieces per hour gross on 1⅜" Model AB. 6 operations include taper turn, end form, thread roll.

## TOUGH ALLOY?

PILOT 1⅛" diameter x 4⅛" long, SAE 8620 steel. 15 pieces per hour gross on 1⅜" Model AB. 7 operations include box mill, cross turn, thread.

## MILD STEEL?



HOUSING 1½" diameter, SAE 1020 steel. 15 pieces per hour gross on 1⅝" Model AB. 6 operations include heavy drill, deep form, tap.

## BRASS

THREADED BUSHING ⅝" hex, free machining brass. 225 pieces per hour gross on 1⅜" Model AB. 7 operations.

## or ALUMINUM?

RETAINER 1½" diameter, 245-T4 aluminum. 65 pieces per hour on 1⅝" Model AB. 7 operations.

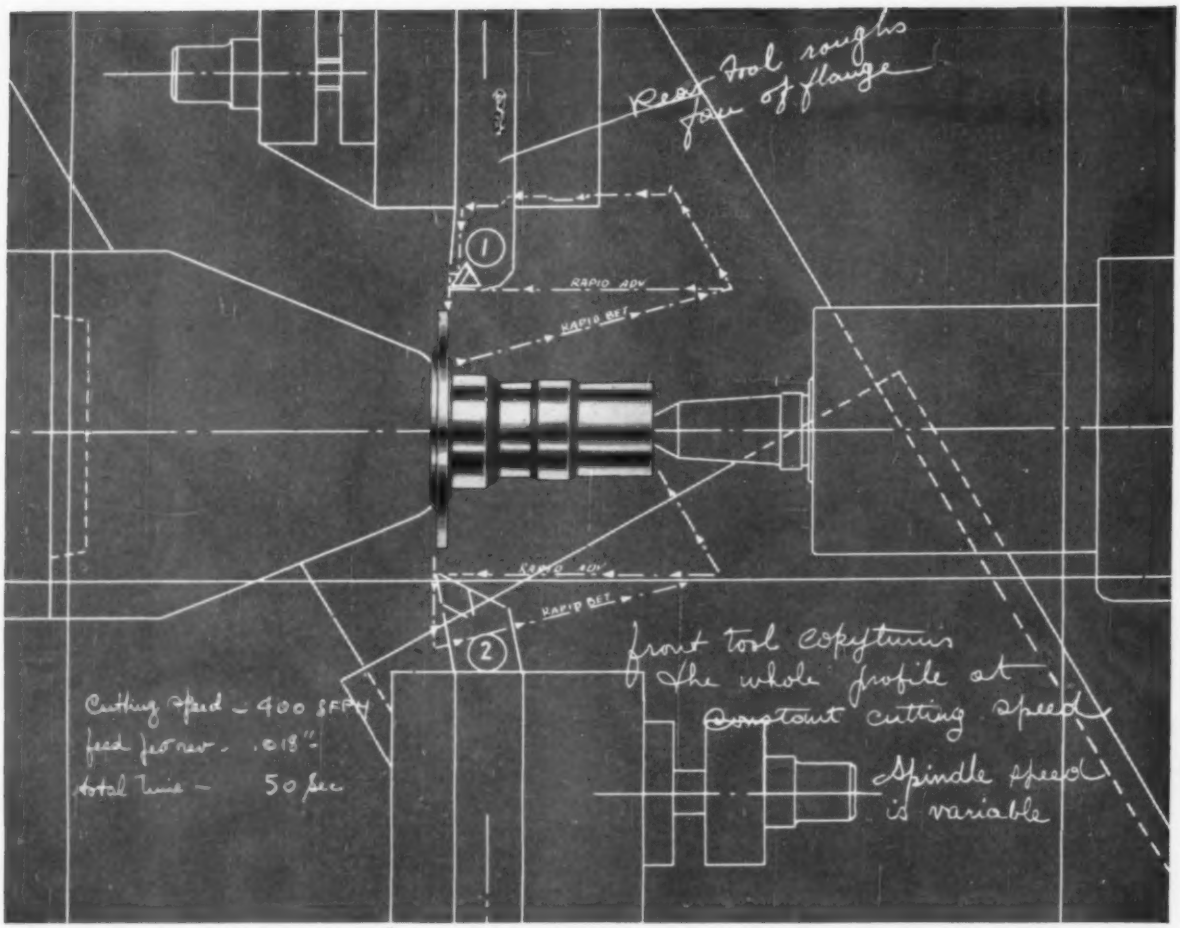
***Remember,***
**CLEVELANDS CUT COSTS!**

## THE CLEVELAND AUTOMATIC MACHINE COMPANY

**4928 Beech Street**
**Cincinnati 12, Ohio**

SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • S. ORANGE

**Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines**

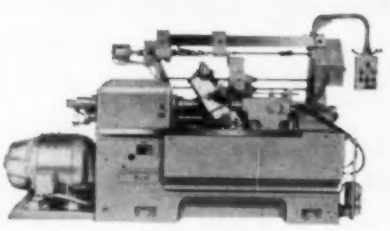

Rear tool roughs face of flange
RAPID ADV
RAPID RET
RAPID ADV
RAPID RET
Front tool copyturns the whole profile at constant cutting speed
Spindle speed is variable
Cutting Speed - 400 SFPM
feed per rev. .018"
total time - 50 sec

*In 50 seconds*

## the Conomatic Pilot copyturns this entire profile at constant cutting speed

The Conomatic Pilot is the only multicycling copying lathe that provides constant feed per revolution by means of a piloted hydraulic feed—an important reason why you can profile turn parts like this to very close tolerances on all surfaces at full production speeds. When used for finishing only, the Conomatic Pilot can often eliminate green grinding operations.

Write today for details of the Conomatic Pilot lathe.



**The Conomatic Pilot Model KU** is a hydraulically-controlled multicycling copying lathe that can automatically reproduce practically any profile, using a motorized rotating template. It can be adapted to a wide variety of slides and tool stations.

# Conomatic

**CONE AUTOMATIC MACHINE CO., INC., WINDSOR, VT.**

**PILOT DIVISION**

**30 Rockefeller Plaza, New York 20, N. Y.**

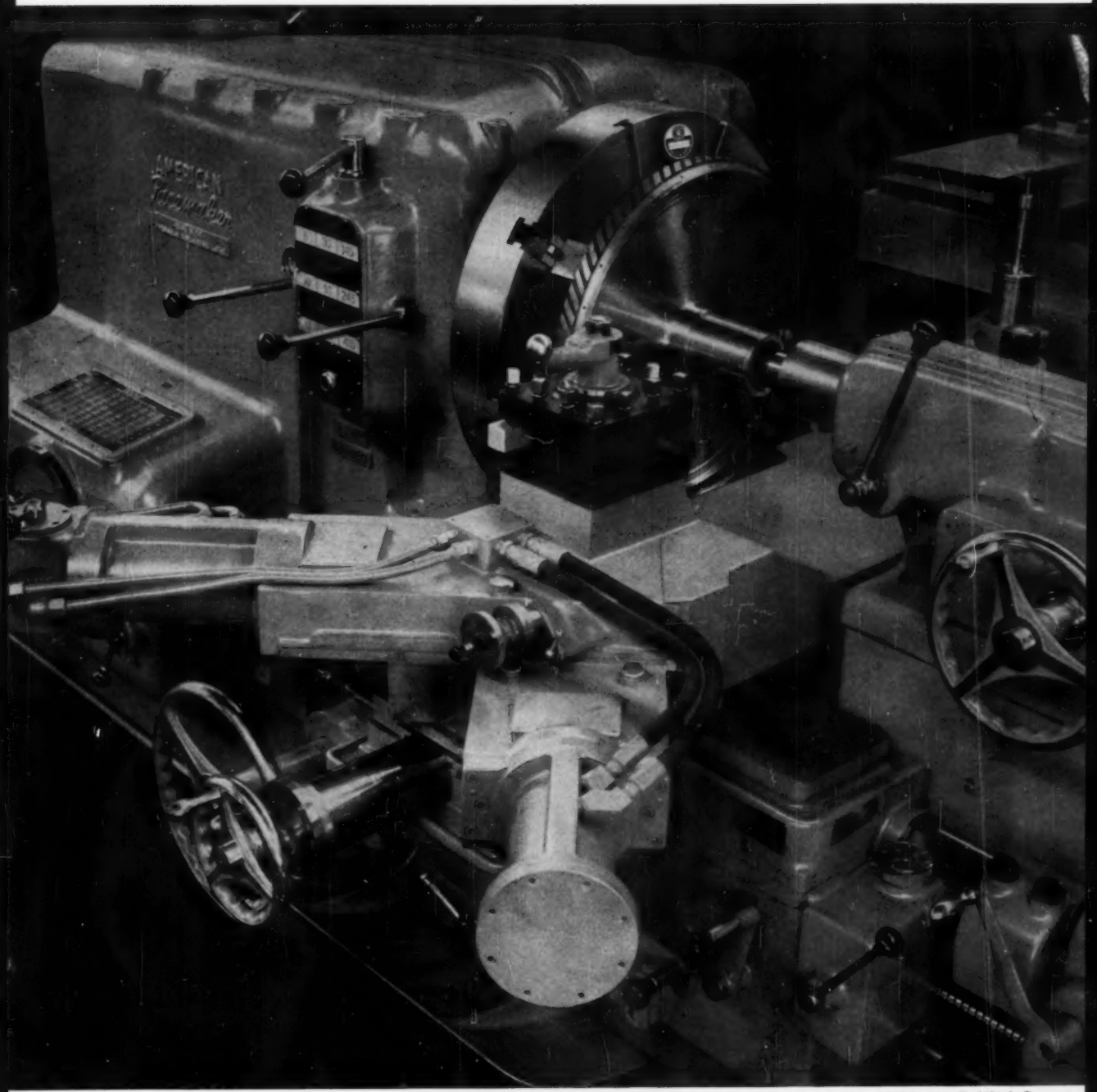


Photo courtesy of The American Tool Works Company

**THE LATHE** — *American Pacemaker 25" Style "G" Hydraulic Duplicating Lathe*

**THE OPERATION** — *Machining a jet engine compressor wheel*

**THE CHUCK** — *Horton, of course*

HORTON CHUCK DIVISION

**Greenfield Tap and Die Corporation**

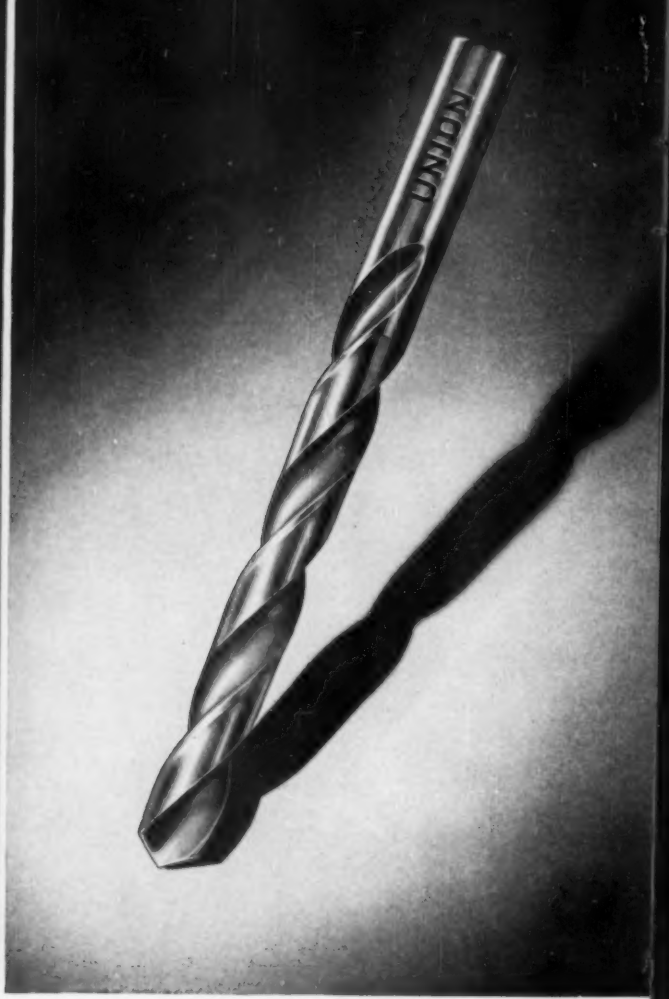
Windsor Locks, Connecticut

HORTON Since 1851 CHUCK

***Call Your Horton Distributor Now!***

*If you use twist drills as fast as some folks chain smoke...*

*This brand cuts down your drill usage, production time and costs!*




## *The more twist drills you use, the more you need Union*

Union also manufactures milling cutters, gear cutters, hobs, reamers and carbide tools. Available nationally through Union warehouses in Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York City, and San Francisco. S. W. CARD DIVISION, Mansfield, Mass.; BUTTERFIELD DIVISION, Derby Line, Vt.

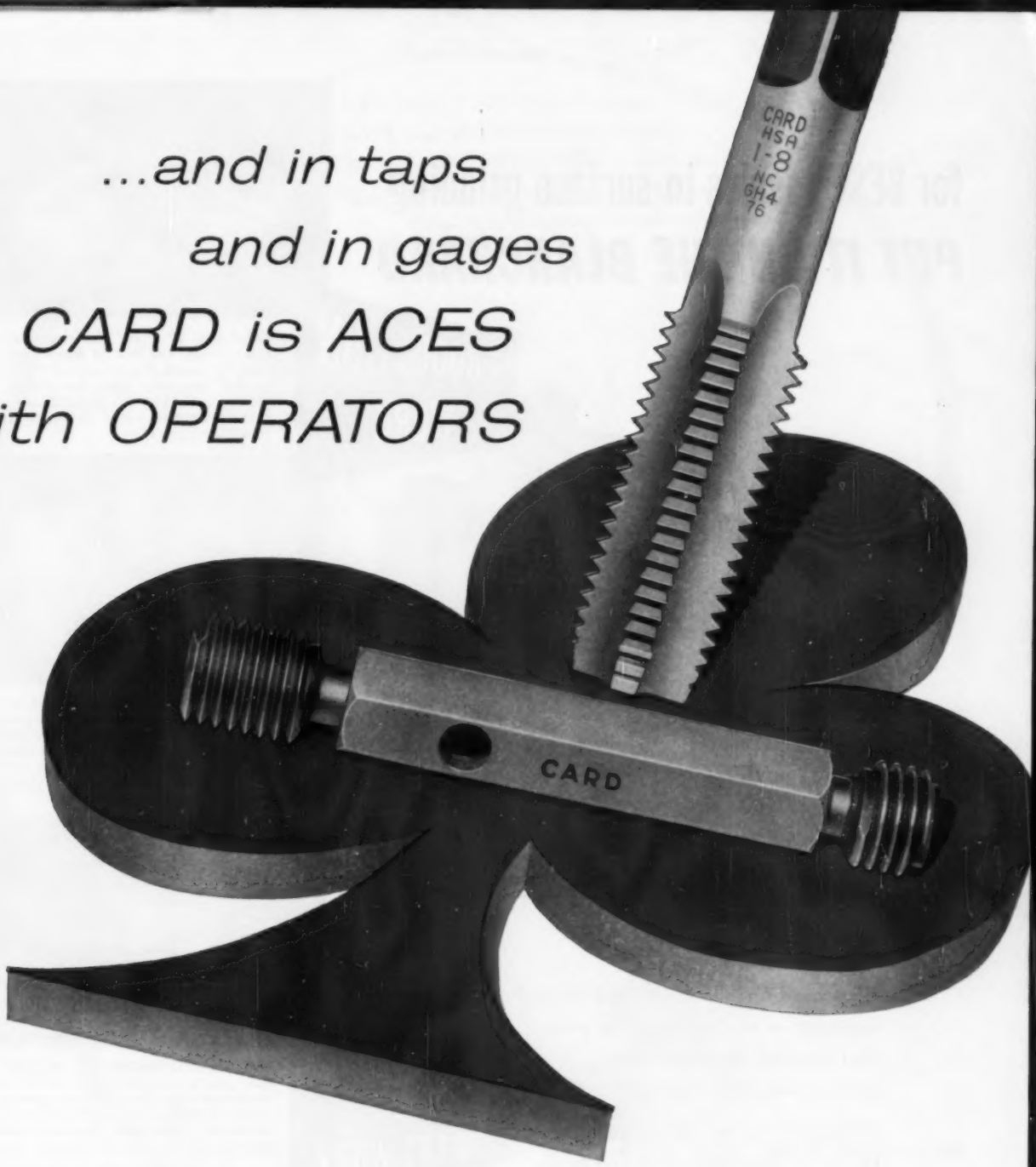
# UNION

TWIST DRILL COMPANY, Athol, Massachusetts

***See Your UNION DISTRIBUTOR for cutting tools that will save you time and money***

Call Your Horton Distributor Now!

# ...and in taps and in gages CARD is ACES with OPERATORS



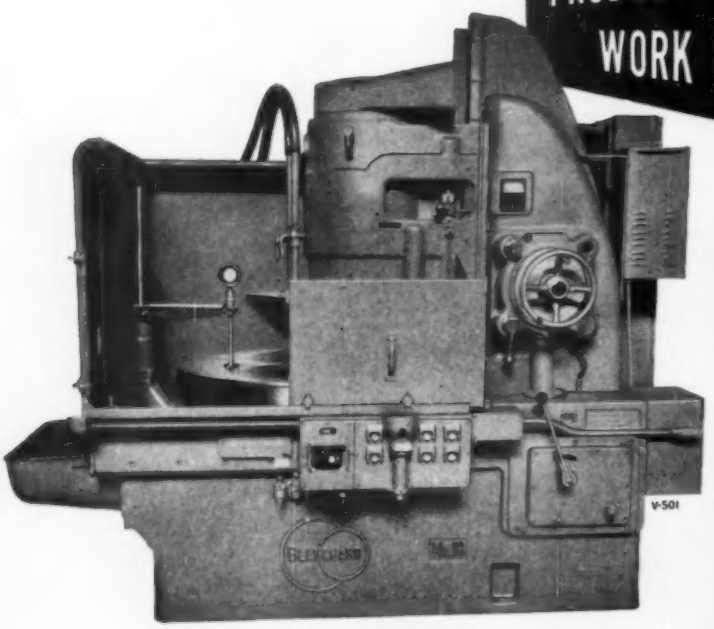

"Card taps and gages are action-mated to the job," are the words actual operators use to describe why they are precise and accurate. Tool after tool . . . shipment after shipment . . . the Card Product is exactly what the operator expected it to be. S. W. CARD DIVISION, Mansfield, Mass. Card Warehouses: Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York, San Francisco.

# CARD

DIVISION OF UNION TWIST DRILL COMPANY

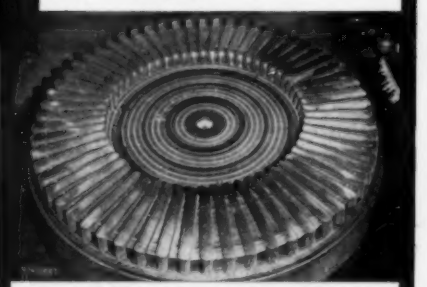
***— Serving you through fine distributors from Coast to Coast***

# for BEST results in surface grinding...
# *PUT IT ON THE BLANCHARD*



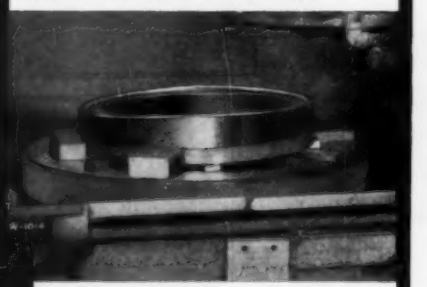
## PRODUCTION WORK

**SIDE PLATES.** 9" x 18" plates ground from rough on No. 18 Blanchard with 36" chuck. Stock removal 1/16" to 1/8" per side. Held flat within .003", parallel to .001", and to dimension tolerance of ±.001". Production: 30 surfaces per hour.

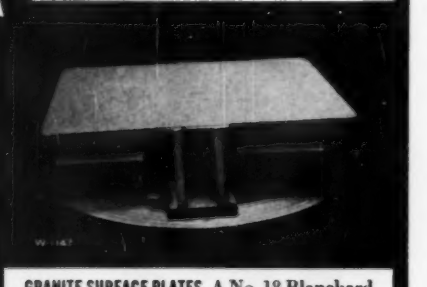


**CONNECTING LEVERS.** Cast iron levers ground in special magnetic fixture with pins located in "vee's". Stock removal per side is 1/32" to 1/16"; must be flat and at right angles to pins. No. 18 production: 180 pieces per hour, compared to 20 pieces per hour by former method used.

## MAINTENANCE AND ODD LOT WORK



**HARDENED STEEL PUNCHES.** This 24-13/16" dia. punch, reground on a No. 18, is centered radially on 36" magnetic chuck. Duplicate circumferential and radial shear reliefs are generated with two setups.



**GRANITE SURFACE PLATES.** A No. 18 Blanchard reconditions this 18" x 34" granite surface plate by grinding it flat within .0002". 3/16" of stock is removed in 5 hours.

Blanchard Grinders are used throughout industry on surface grinding jobs that demand the utmost in production, finish and accuracy.

Whatever *you're* surface grinding, there's a Blanchard designed to do the job speedily and accurately.

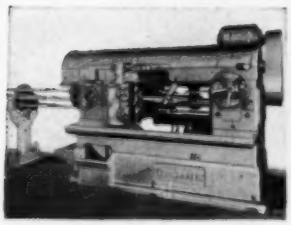
***PUT IT ON THE*** **BLANCHARD**

*Send for free copies of "Work done on the Blanchard", fifth edition, and "The Art of Blanchard Surface Grinding".*

**THE BLANCHARD MACHINE COMPANY**
**64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.**

If you haven't read this important booklet, your production line may be operating at less than peak efficiency. Your operations may be beating competition with HSS today, but you will likely need carbide tooling to be the leader tomorrow.

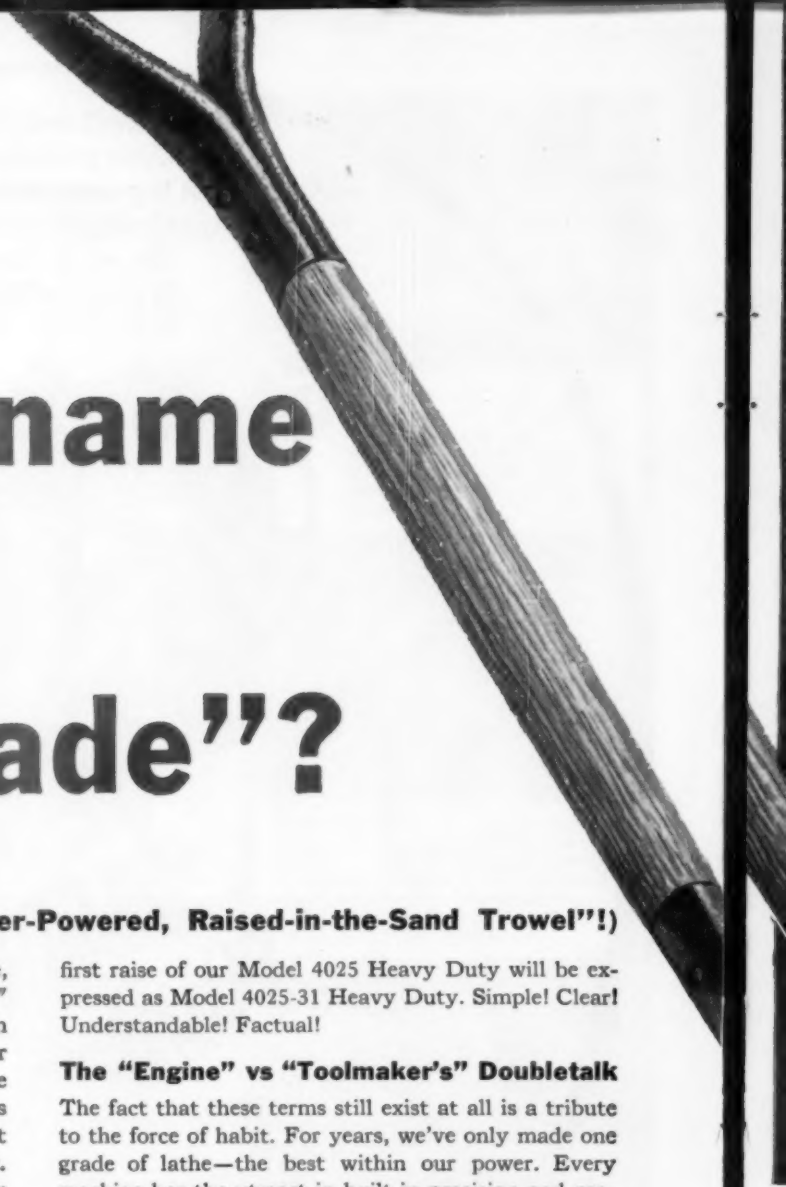
Write for your free copy of this important booklet today!



# Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U. S. A.

# Know a better name than "Spade"?



**(It certainly isn't "Heavy-Duty, Super-Powered, Raised-in-the-Sand Trowel"!)**

Same goes for lathes! Why call a lathe a 16″ machine, when it may swing 18½″ over the bed and only 12½″ over the cross slide—more or less? Especially when most lathe types are used largely for between center work? Monarch is proud to be a part of the Lathe Group that has performed a real service to lathe buyers by proposing the commonsense, informative four-digit designation system. And *we're* going even further. Henceforth every Monarch model designation on new lathes will give you a complete description at a glance!

### The Four-Digit System

This is simplicity itself. The first two digits reveal swing or clearance over bed and carriage wings. Second two digits, swing over cross slide on the basic machine. A reference to the chart shows how immediately informative this is.

### Raising—and Heavy Duty Information

Now, you know where you stand with Monarch—as in contrast with such practices as calling a basic 20″ machine a 20″ heavy duty, then raising it to 25″ and calling the raised model a 25″ standard.

All Monarch lathes designated "Heavy Duty" are engineered heavy duty machines—and the specifications reveal the weight, power, and capacity to justify the term. Where engineered raises in the sand are involved, the basic designation will be used, followed by a dash and the raised clearance. For example, the first raise of our Model 4025 Heavy Duty will be expressed as Model 4025-31 Heavy Duty. Simple! Clear! Understandable! Factual!

### The "Engine" vs "Toolmaker's" Doubletalk

The fact that these terms still exist at all is a tribute to the force of habit. For years, we've only made one grade of lathe—the best within our power. Every machine has the utmost in built-in precision and production because the close manufacturing limits of today are equal to and often surpass the toolroom limits of yesterday, while high labor rates make it essential that toolroom operations be placed on the highest possible productive basis. It is true that a lathe for toolroom use must, as a rule, have more flexibility than one for manufacturing purposes. So, on many models, we furnish a standard complement of additional equipment. Machines with such equipment differences are designated with the suffix "T". Model 1610 becomes Model 1610-T. As for the word "Engine" applied to a lathe, it lost meaning years ago. Let's bury it!

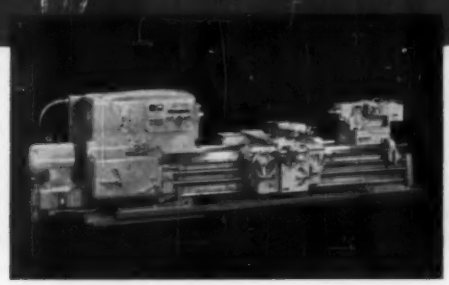
### In a Nutshell...

**Now you know how to appraise the swing capacity of every Monarch Lathe at a glance. We hope the day will come soon when the same nomenclature will apply to all lathes made. Then nobody will have to dig for the facts—The Monarch Machine Tool Company, Sidney, Ohio.**

## SIZE DESIGNATIONS

| Machine | New Four-Digit System | Outmoded Size Designations |
|---|---|---|
| Series 62 Preselector Dyna-Shift | 1610 | 13″ Engine |
| | 1610-13 | 13″ Raised Engine |
| | 2013 | 16″ Engine |
| | 2013-16 | 16″ Raised Engine |
| | 2516 | 20″ Engine |
| | 2516-19 | 20″ Raised Engine |
| Series 80 Heavy Duty Dyna-Shift | 2516 | 20″ Heavy Duty Engine |
| | 2516-20 | 20″ Heavy Duty Raised Engine |
| | 3220 | 25″ Heavy Duty Engine |
| | 3220-24 | 25″ Heavy Duty Raised Engine |
| | 3220-28 | 25″ Heavy Duty Raised Engine |
| Series 90 Heavy Duty Dyna-Shift | 4025 | 32″ Heavy Duty Engine |
| | 4025-31 | 32″ Heavy Duty Raised Engine |
| | 4025-36 | 32″ Heavy Duty Raised Engine |

NOTE—Older models, namely Model EE Manufacturing and Toolmaker's, Series EE-Model 1000, Series 61 Engine and Toolmaker's Lathes and Models M, N, and NN Heavy Duty Engine Lathes will retain old designations because of long-established user acceptance. The suffix "T" after the following model designations denotes inclusion of additional equipment usually required for toolroom use—1610, 1610-13, 2013, 2013-16, 2516, 2516-19.



**For Example:**

Monarch Series 90 Heavy Duty Dyna-Shift—Model 4025-31
Basic Clearance over Bed and Carriage Wings—40″
Basic Swing over Cross Slide—25″
Raised Swing over Cross Slide—31″

Monarch
TURNING MACHINES
ACCURACY • ECONOMY • LONG LIFE
FOR A GOOD TURN FASTER . . . TURN TO MONARCH

**CATERPILLAR**

**proves...**

*good reamer design helps hold size*

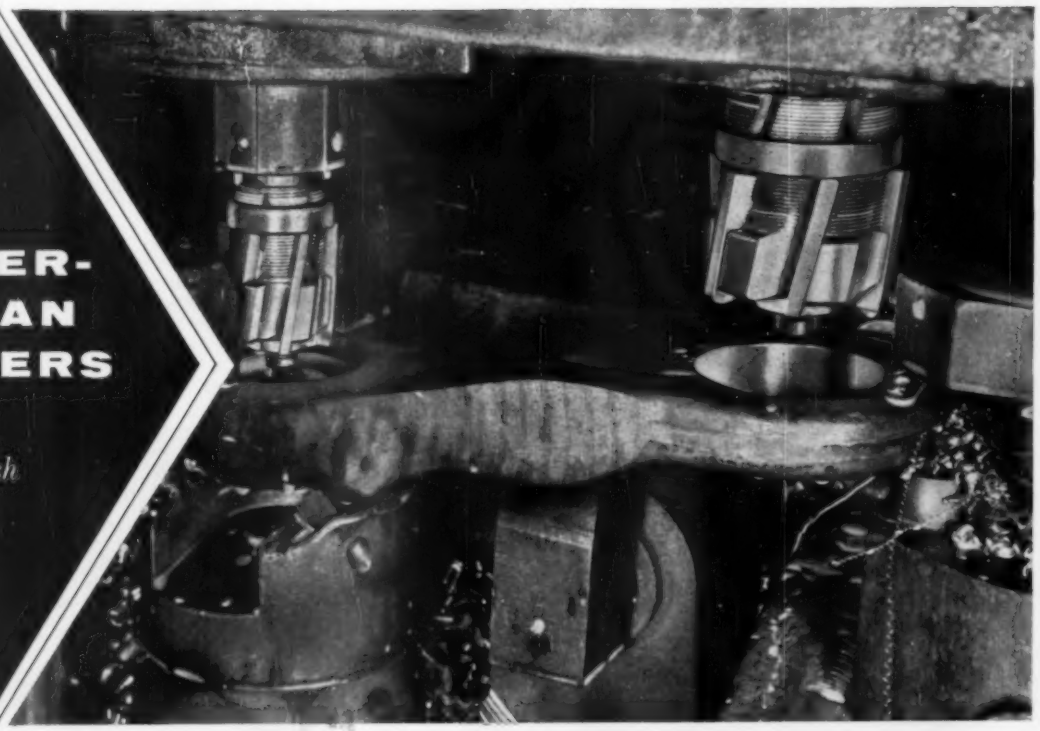
*and*

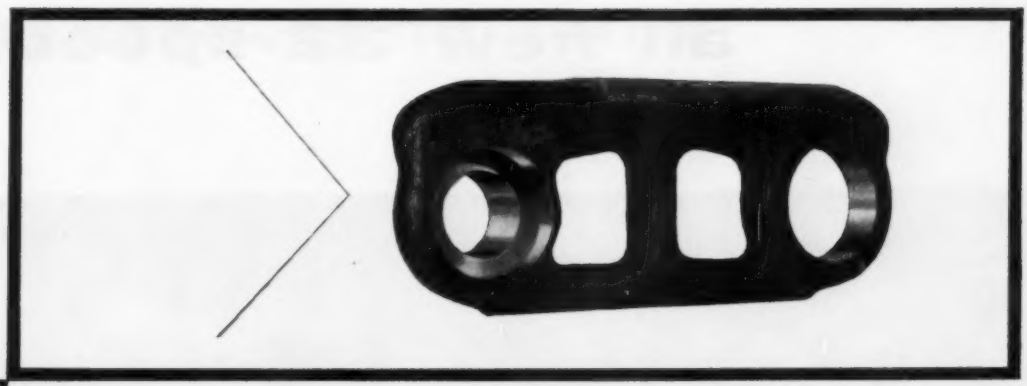
*tool life in tough materials*

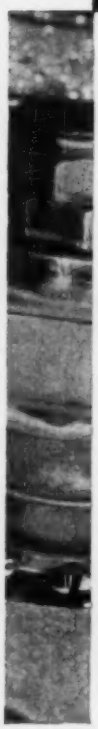
**BARBER-COLMAN REAMERS**

**provide**

*required finish*
*and*
*production*







Caterpillar Tractor Co. finish reams 2 holes in these tough forged steel track links with the required surface finish and a production rate of 102 pieces per hour from each machine. Previous operations include core drill and rough ream the large hole, and core drill and counterbore the small hole. Four hundred pieces are obtained per sharpening in this tough, hard material. Finish reaming is used because it is the only means available which will produce the required finish and meet the high production requirements of this job.

**these are the job facts:**

| | | |
|---|---|---|
| Bore Size | 2.605" | 1.738" |
| Stock Reamed | .025" | .025" |
| Cutting Speed | 75 rpm. | 100 rpm. |
| Production | 102 per hr. | 102 per hr. |
| Feed | .011" per rev. | .013" per rev. |

These Barber-Colman reamers were specially designed to suit the requirements of this part. The design of the reamer body provides maximum backing for the cutting edge and a large chip space in front of the blades to insure good chip flow.

The direction and angle of spiral are designed to provide the most efficient cutting action in this material. The reamer body is specially heat treated for toughness. These reamers are sharpened with a positive primary clearance. The nose form includes a chamfer, lead, and straight portion which are specifically designed for the job. Behind the nose, a back taper provides adequate clearance in the finished hole. These elements of the profile are accurately maintained by cam-controlled sharpening on the Barber-Colman Combination Sharpening Machine.

When you have hole finishing problems involving accuracy, finish, tool life and production requirements, call a Barber-Colman reaming expert and talk over with him the most economical way to get the results you want.

**BARBER-COLMAN COMPANY**

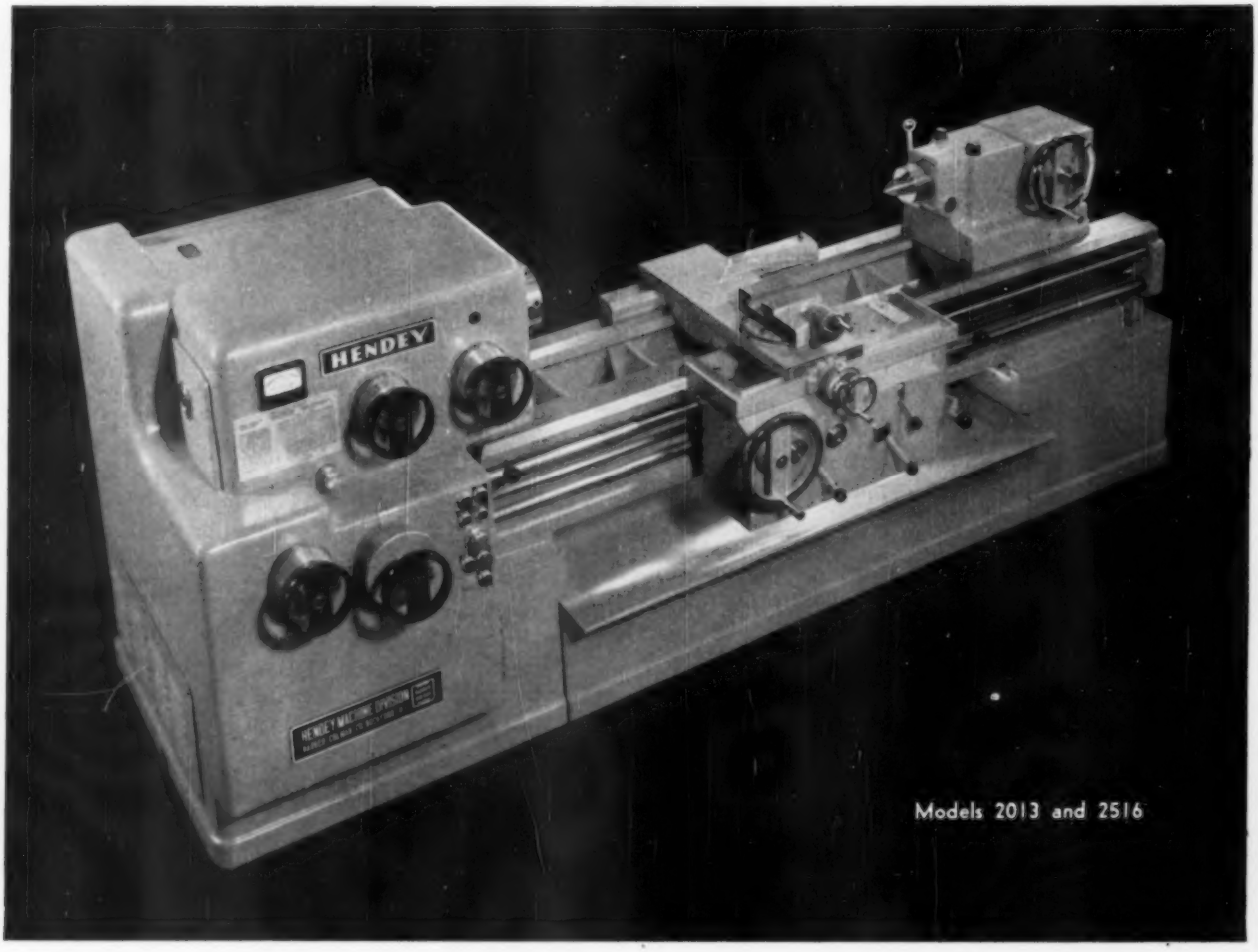
919 ROCK STREET • ROCKFORD, ILLINOIS

*Hobs • Cutters • Reamers • Hobbing Machines • Hob Sharpening Machines*

BARBER COLMAN

# NOW! FROM HENDEY...

## all new 32-speed




Models 2013 and 2516

*More rigidity, more threading features, more lathe per dollar!*

# geared-head lathe

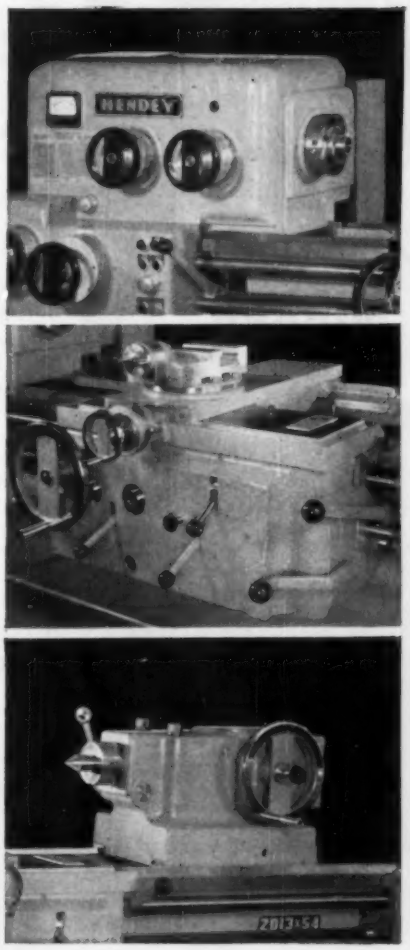
Here are the all-new Hendey No. 2013 and No. 2516 lathes, with a 32-speed geared head (up to 2000 rpm), a complete line-up of threading features, and heavy-duty design combined with toolroom precision. The 32-speed headstock transmission contains crowned, flame-hardened spur gears which are automatically lubricated. You select speeds simply by shifting gears. Greatly simplified mechanical design gives you lower maintenance costs — more machine, dollar for dollar, than any other lathe in its class.

Three sets of super-precision tapered roller bearings support the spindle at both ends and in the middle, increasing accuracy and improving finish. An automatic spindle adjuster eliminates any manual adjustment of the spindle bearings regardless of the spindle speed.

The extra-heavy bed casting is made of dense, wear-resistant semi-steel, which is induction-hardened and ground on all way surfaces. Lathes can be furnished with a 15, 20, or 25 hp spindle drive motor and come equipped with a load meter and automatic overload release for the carriage feed.

Hendey has all the threading features, including: (1) multiple-thread indexing spindle, (2) built-in thread-chasing dial, (3) 66 feed and thread changes, with 2 to 120 quick-change threads per inch and feed range from .0015 in. to .091 in. per revolution, (4) reverse lever on apron, (5) automatic micrometer stops, (6) ball-thread-chasing stop on cross-feed screw, (7) hardened and precision-ground cross-feed screw and compound screw, (8) automatic, filtered lubrication to the half nuts.

Compare these tailstock features with other lathes on the market: Weighing almost 400 lb, the tailstock can be positioned quickly and easily with one hand. And the ways under it are hardened and ground. Large 4½ in. diameter spindle has a full 10 in. extension, with slow and rapid traverse speeds.




Hendey machine division
BARBER-COLMAN COMPANY
91 Loomis St., Rockford, Illinois

BARBER COLMAN ®

L&I
DRILL &
REAMER
BLANKS

Highest Precision

MIRROR
FINISH

LAVALLEE & IDE, INC. L&I

LAVALLEE & IDE, INC. L&I

AVAILABLE
FROM STOCK

Drill Blanks
up to ½" +.0000", −.0003"
over ½" +.0000", −.0005"

Reamer Blanks
up to ½" +.0002", −.0000"
over ½" +.0005", −.0000"

- Fractional Sizes 1/16" thru 1"
- Wire Gage Sizes #1 thru #80
- Letter Sizes A thru Z
- Complete Sets

Any size from .0135" thru 1.0000"!

L&I

"the reamer specialists"
LAVALLEE & IDE, INC.
CHICOPEE, MASS.

# Letters...

To American Machinist
330 W 42nd St, NY 36, N Y

## Moonlighters

Dear Sirs:

Have you ever considered the possibility that the "moonlighter," who works at two jobs (*AM*—Aug 12 '57, p99), is only an unfortunate victim? Our society has given him additional leisure time, but it has also given him a large number of expensive ideas about how to spend the time. On top of that, the government provides a daily example which seems to prove that a permanent debt is not a bad thing.

The man with leisure time can choose boating, or photography, or hi-fi, or any of a number of other wonderful things that he doesn't have to pay for right now. He can have them now and pay later. And there's always the automobile, which is supposed to indicate how successful he is, but usually indicates only how far he has gone into debt.

Undoubtedly, many people, once they get themselves equipped to enjoy their leisure, find that they have to become moonlighters just to keep up the payments on their installment plans. Rather a vicious cycle, isn't it?—they have to work during their leisure time in order to pay for all the stuff that was supposed to make their leisure enjoyable.

However, if that's all the problem amounts to, there's still hope. A situation like that might be only temporary, and a person might learn enough from it to avoid getting himself into the same bind another time. Let's hope so.

P J B
*Burlington, Vt*

## Our "sideline"

Dear Sirs:

We refer to your Editorial Reprint Order Form and shall be obliged if you will let us know whether the publication entitled *Tools of Our Trade (1953 Edition)* is still available, and also the price per copy, delivered our address.

We wish to make quite sure that this publication is still available before going to the trouble of obtaining dollars in payment.

Heenan & Froude, Ltd
*Worcester, England*

Dear Sirs:

As a regular subscriber to *American Machinist*, we are won-

## SHOPMATES

*N. Jarvis*

PIPE DOWN YOU GUYS!! QUIET!! CUT OUT ALL THAT POUNDIN'— I CAN'T HEAR HOW THIS THING SOUNDS!!
SOME GUYS WORK BY "RULE OF THUMB" — SOME GUYS WORK BY EYE. BUT I NEVER HEARD OF A NUT SPLITTER THAT WORKED BY EAR!
THAT'S JUST AN EXCUSE TO COVER UP FOR A BIG BOO BOO HE'S ALREADY MADE — THE MORE HE CAN SPREAD THE BLAME AROUND THE BETTER FOR HIM!!
N. JARVIS

# Switch to lowest-cost parts duplication with

# CINCINNATI HYDRAGUIDE TRACER LATHES

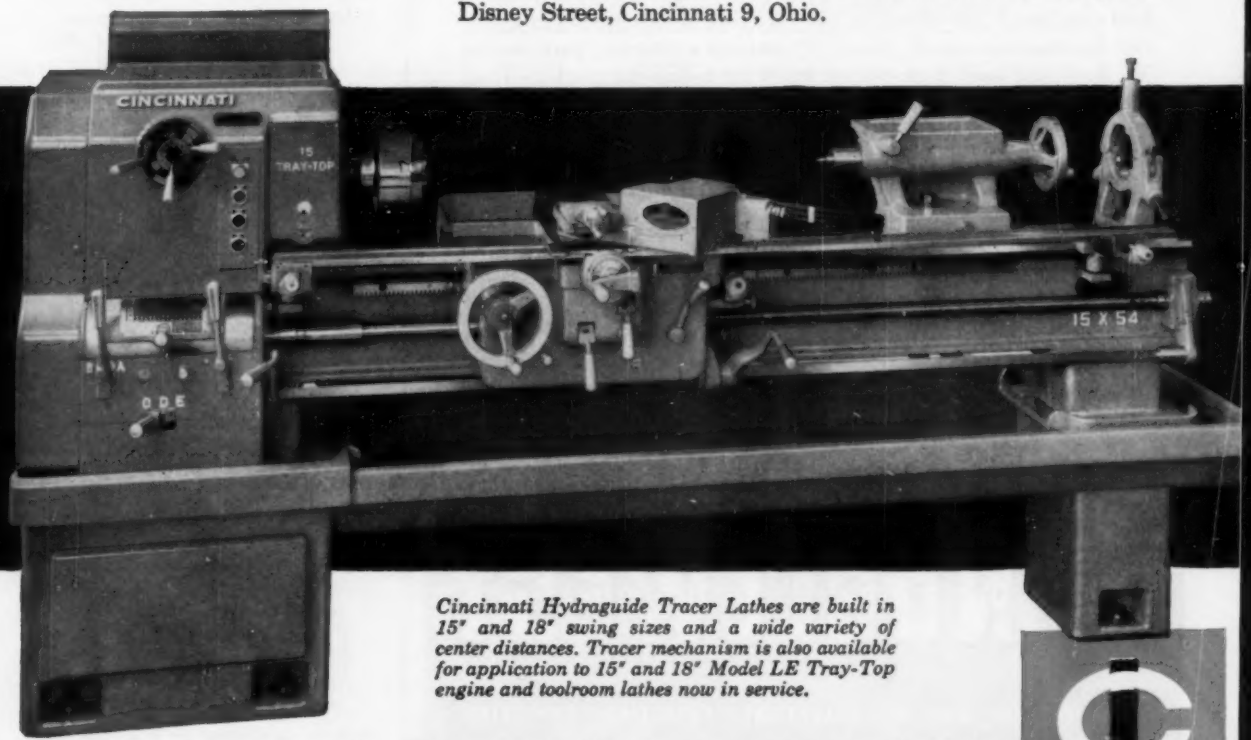
"Head of the Class" Engineering—

Compact design provides shortest hydraulic linkage for more sensitive control . . . requires no additional floor space. Tool is accurately guided by sensitive stylus following the easily-accessible flat template. Automatic duplication . . . less operator attention . . . lowest tooling cost . . . minimum tool setting . . . less scrap . . . lowered cost per piece!

Just push this button to provide lowest-cost tracer machining on these new Cincinnati Hydraguides® . . . yet there is no interference with standard lathe operation. Everything is on the carriage, but nothing is in the way. All controls, template and tool are on the operating side for maximum convenience.

All the proven Tray-Top features are included, of course . . . PLUS an increase to 5 HP for even greater performance. Here is NEW versatility . . . NEW convenience . . . NEW profit possibilities. And it's *still* an ECONOMY-PRICED lathe!

Ask your C L & T Dealer for the Hydraguide story. Write today for full data—catalog H-150. Cincinnati Lathe and Tool Co., 3207 Disney Street, Cincinnati 9, Ohio.




*Cincinnati Hydraguide Tracer Lathes are built in 15" and 18" swing sizes and a wide variety of center distances. Tracer mechanism is also available for application to 15" and 18" Model LE Tray-Top engine and toolroom lathes now in service.*

center on **cincinnati lathes and drills**

ENGINE, TOOLROOM, TRACER AND FIXED GAP BED LATHES AND A COMPLETE LINE OF DRILLING MACHINES

Automation
IN MARKING

MARKS
7500 PIECES
PER HOUR

Capable of speed-marking 7500 parts per hour, this hopper and dial feed machine is just about the nearest thing to automation in marking. As illustrated above, Model 435 features a vibratory parts feeder, 30″ bowl and dual track carrier. Parts are fed to the machine from the bowl, then permanently marked and automatically ejected. Spring pressure controls depth of mark and insures clear uniform imprint. Ideal for speed-marking solid, round heavy walled or conical parts. Like all Noblewest Roll Marking equipment, it produces permanently indented impressions . . . good for the life of your product . . . at *faster speed and lower cost.* For detailed information write Noble & Westbrook Manufacturing Company, 17 Westbrook Street, East Hartford 8, Connecticut.

*Noblewest is equally famed for tools, fine marking dies, and fixtures.*

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NOBLEWEST IMPROVED MARKING DEVICES
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ORIGINATORS OF THE ROLL MARKING PROCESS
EQUIPMENT FOR MARKING · GRADUATING · EMBOSSING · NUMBERING

dering how we could get hold of reprints of Special Report No. 428, entitled "How to Cut Off Metals."

I think you realize many magazine subscribers do not read each and every article, and it is our exprience that reprints receive very careful consideration when properly mailed to select individuals.

We think that Special Report No. 428 fits into that classification, and we would certainly appreciate your reply on what basis additional copies could be made available.

Paul Berner
*Star Machinery Co*
*Seattle, Wash*

Tools of our Trade, a *compilation of six special reports, is still available at $1.25 per copy. Other special reports dating back to 1951 are available at prices ranging from 15¢ to 50¢, depending on the length of the report. A current list of the items in stock and their prices can be obtained from our Reader Service Dept*—Ed.

## Powder-metal bearings

Dear Sirs:

We would like to have more information of powder-metal bearings with built-in graphite (*AM* —Dec 17 '56, p89), if available.

P Fall
*Cleveland Ohio*

*The American representative of the German firm that developed these bearings will be glad to*

## Helpful Henry

*by L. Hoppes*

*"Stuffy in here—better get a window open!"*

*supply full details. Write to Deva Metal Corp, P O Box 146, Ridgewood, NJ*—Ed.

## CALENDAR

AMERICAN MACHINE TOOL DISTRIBUTORS ASSOCIATION—Annual meeting, Sept 22-24, Hotel Cleveland, Cleveland, Ohio.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS — Fall meeting, Sept 23-25, Statler Hotel, Hartford, Conn.

STANDARDS ENGINEERS SOCIETY—Annual meeting, Sept 23-25, Hotel Commodore, New York, NY.

SOCIETY OF AUTOMOTIVE ENGINEERS —Aeronautic meeting and display, Sept 30-Oct 5, Ambassador Hotel, Los Angeles, Calif.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS and AMERICAN SOCIETY OF LUBRICATION ENGINEERS —Lubrication Conference, Oct 7-9, Royal York Hotel, Toronto, Ontario.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Power conference, Oct 21-23, Americus Hotel, Allentown, Pa.

AMERICAN SOCIETY FOR METALS—National Metal exposition and congress, Nov 4-8, International Amphitheatre, Chicago, Ill.

AMERICAN STANDARDS ASSOCIATION —National conference, Nov 13-15, St Francis Hotel, San Francisco, Calif.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS — Annual meeting, Dec 1-6, Statler Hotel, New York, NY.

SOCIETY OF AUTOMOTIVE ENGINEERS —Annual meeting and display, Jan 13-17, The Sheraton-Cadillac and Statler Hotels, Detroit, Mich.

SOCIETY OF AUTOMOTIVE ENGINEERS —Production meeting and forum, March 31-Apr 2, The Drake, Chicago, Ill.

SOCIETY OF AUTOMOTIVE ENGINEERS —Aeronautic meeting and display, Apr 8-11, Hotel Commodore, New York, NY.

AMERICAN WELDING SOCIETY — Spring meeting and welding show, Apr 14-18, Statler Hotel, St Louis, Mo.

AMERICAN SOCIETY OF TOOL ENGINEERS—Tool show, May 1-8 (closed Sunday), Convention Center, Philadelphia, Pa.

AMERICAN SOCIETY FOR METALS—Southwestern metal exposition and congress, May 12-16, State Fair Park, Dallas, Texas.


REED RID

# Thread Rolling Attachments

## Provide Full Diameter Range To Maximum Capacity

A multi-purpose tool of wide range for rolling machine screw threads, straight and taper pipe threads (including dryseal), annular rings, oil grooves, knurling and other cold forming operations. Eliminates secondary operations by rolling behind shoulders.

- For over 100 different single and multiple screw machines
- Adapters for more than 300 cross-slide applications
- Easy to set up and operate
- Simple precision matching with pre-matched rolls
- Dovetail clamping arrangement simplifies setup by permitting head to be removed from adapter
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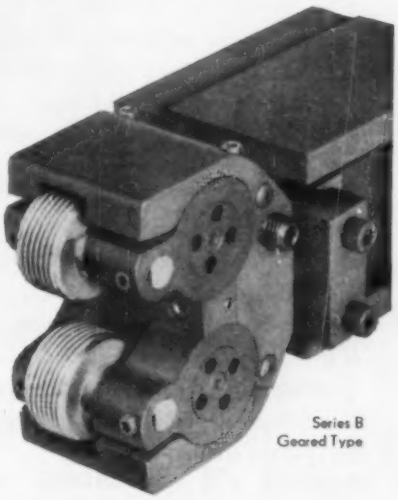

Series B
Geared Type

**FIVE STANDARD SIZES CARRIED IN STOCK**

| Model No | Complete Diameter Range | *Pipe Threads That May Be Rolled | Approximate Number of Common Screw Threads That May Be Rolled |
|---|---|---|---|
| B 8 | 0-1/2" | 5 | 70 |
| B 10 | 0-5/8" | 7 | 80 |
| B 13 | 1/8"-13/16" | 9 | 90 |
| B 18 | 1/4"-1 1/8" | 15 | 105 |
| B 36 | 3/8"-2 1/4" | 18 | 185 |

*Straight and Taper Pipe Threads, including Dryseal (NPTF). Change may be made from Straight to Taper Threading by changing rolls only. No other equipment is necessary.

ATTACHMENTS DESIGNED FOR SPECIAL APPLICATIONS

**Rolls for Common Straight Thread and Taper Pipe Thread In Stock—FOR IMMEDIATE DELIVERY**

REED SERVICE PERSONNEL AVAILABLE to assist with initial installation. Application and Operating Instruction Book supplied with each attachment. Complete satisfaction assured

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*Specialists in Thread and Form Rolling Tools and Equipment*

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# $7200 per month saving by large automotive plant after switching to

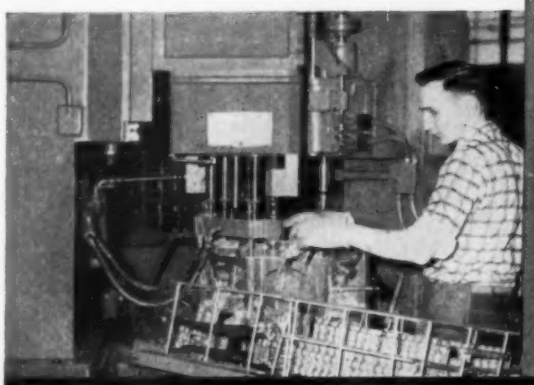
# DASCO D-20

## HEAVY-DUTY SOLUBLE OIL

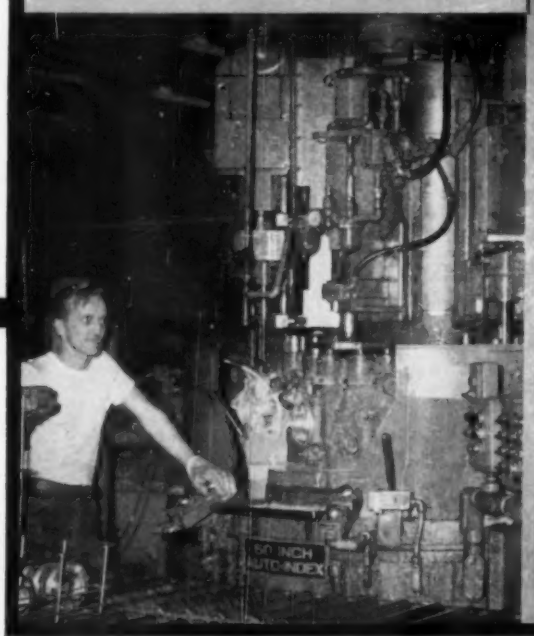
An actual saving of $7200 per month, including labor costs, has been reported by a large automotive transmission plant since switching to Stuart's Dasco D-20—*the first truly heavy-duty soluble oil* formulated and priced for general application!

ONE OIL FOR 365 DIFFERENT MACHINES—This carefully engineered compound eliminates cutting oil confusion—drastically reduces the number of cutting fluids needed in your plant. This plant uses economical Dasco D-20 in standard mixtures on *365 different machine tools*—reducing cutting oil inventory . . . saving service time and cutting oil costs . . . minimizing chance of error—yet taking advantage of all lubricating and cooling properties you expect from a heavy-duty soluble oil.

RANCIDITY ELIMINATED—This user reports that Stuart's Dasco D-20 stays sweet longer—even after long shutdowns. Rancidity is actively resisted by a special germicide additive, the best of a very few germicides that remain effective in the presence of soaps. Stuart's Dasco D-20 has superior wetting ability—remains effective when mixed with water.



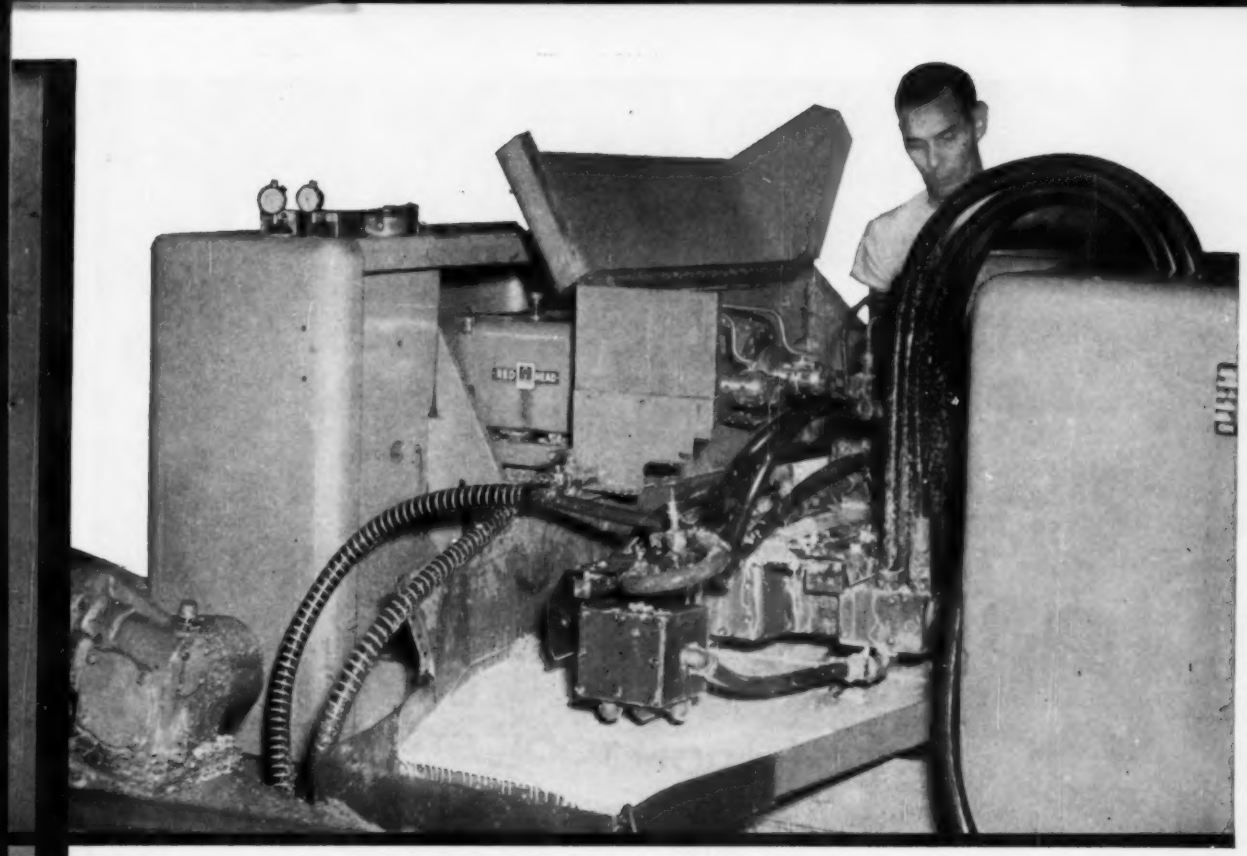
Chips settle faster with Stuart's Dasco D-20, so you have a clean compound in your machine at all times. You get a better finish . . . cooler cutting and grinding.



You can use low-priced Stuart's Dasco D-20 for reaming, boring, drilling, facing, chamfering, milling, tapping, threading, broaching, surface-grinding, and high-speed carbide tool machining.

## For Cutting and Grinding

Stuart's Dasco D-20 maintains or improves efficiency of your cutting and grinding operations. A real heavy-duty emulsifiable oil, it forms a tough, thin film between the cutting tool and the work . . . reducing friction and preventing excessive heating. A wide variety of tough metal-cutting operations, including certain types of broaching, can be done with this *one* low-priced compound. A lean mixture for grinding enables you to take full advantage of improved wheel bonds. Properly applied, it allows you to use high-unit pressure for maximum stock removal . . . keeps wheels open and free-cutting . . . prevents heat checking.



## First low-priced heavy-duty soluble oil with both additives: active germicide and E. P. base

Stuart's Dasco D-20 is the first low-priced soluble oil to offer you both a special anti-rancidity germicide and an extreme pressure base oil additive with high anti-weld and lubricity characteristics. Carefully balanced, high-quality emulsifying agents provide high-grade cooling properties . . . unusual stability for longer life. This multi-purpose, heavy-duty soluble oil gives you ideal characteristics for high-speed machining with carbide cutting tools . . . upgrades finish and tool life on tool steel applications. Stuart's Dasco D-20 has superior wetting ability . . . avoids rust . . . mixes easily . . . keeps machines and parts clean . . . and is preferred by operators.

Phone your
Stuart Service Center

Arrange now to test Stuart's Thermex 33 Hot Die Lubricant on your difficult forging and drawing operations.

DETROIT, MICH. . . . . Tyler 7-8500
CHICAGO, ILL. . . . . Bishop 7-7100
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*Representatives in all principal cities*

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**CANADIAN D. A. STUART OIL CO., LIMITED**

3575 Danforth Avenue, Toronto 13, Ontario

Stuart

**METALWORKING LUBRICANTS**

1½ times actual size

# 220 MILLION PIECES

## FROM THIS 12-STATION TOOL STEEL DIE

Photo courtesy of Werner Die & Stamping Co., Cary, Illinois, makers of this die.

Tolerances on the intricate shaft-mounted spring shown here are plus .003", minus .000" . . . no burrs allowed . . . and stamping speed is better than 240 a minute. This calls for die-making precision—and a precision die set.

Reliable, consistent precision of the Danly Die Set provides the closure accuracy necessary to the performance of this fine die. After this unusually long run of a precision stamping in a tool steel die, the die set is in good condition.

Danly production methods consistently maintain the highest standards of die set precision through individual control of every critical dimension. Thousands of fine tool and die shops agree that the finest die set obtainable is usually the lowest cost insurance on any die-making investment. Find out how Danly precision can save money for you.

**DANLY MACHINE SPECIALTIES, INC.**
2100 S. Laramie Ave. Chicago 50, Illinois

DANLY®

Write for new folder on **"The Importance of Die Set Precision"**

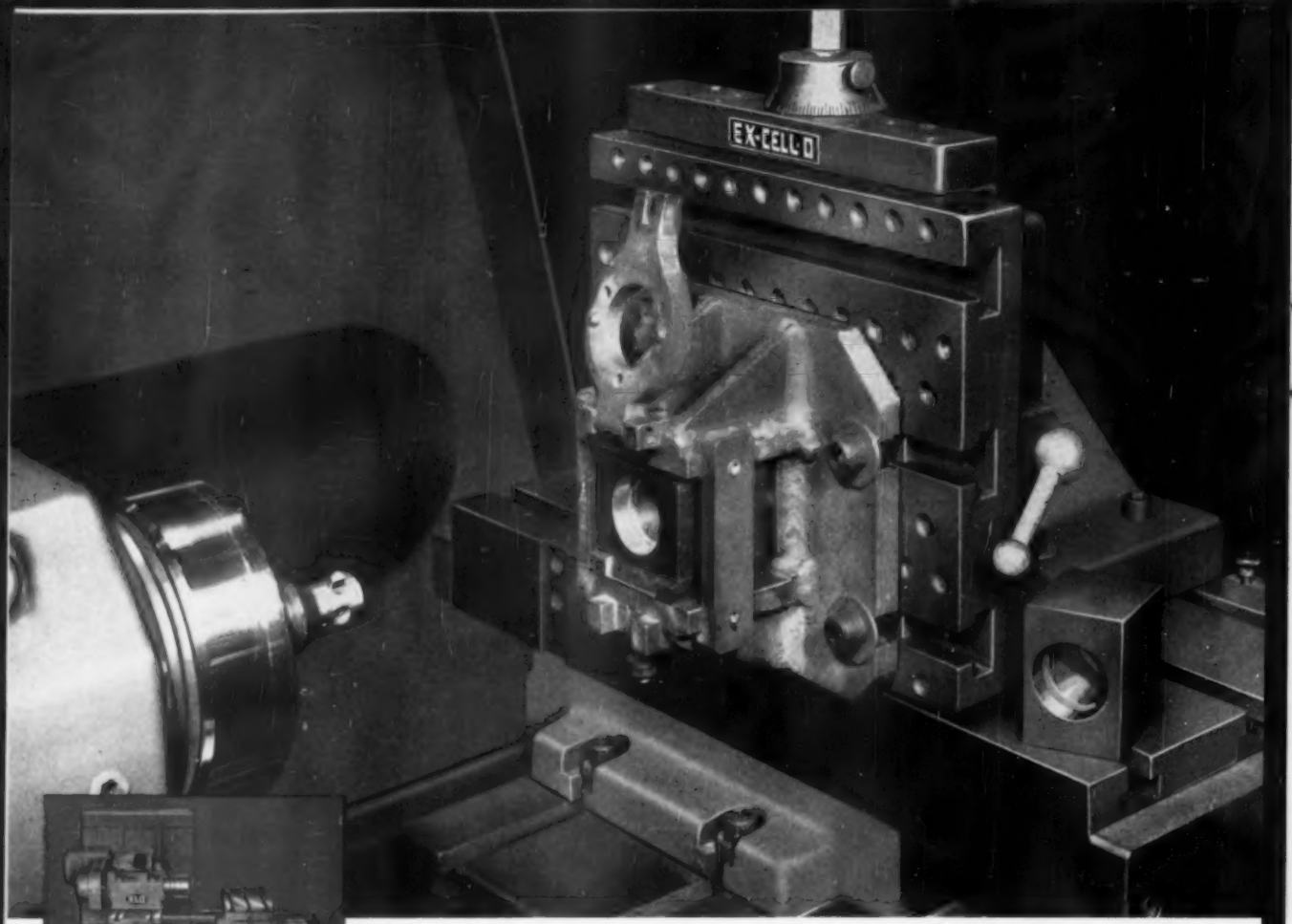
Lists and discusses all critical dimensions . . . shows how and why consistent Die Set precision is vital in every die-making operation. Send for a free copy.

# Spot news...

- **First break in the prices of used machinery in a long time** showed up recently on the hard-hit-by-defense-cutbacks West Coast. Example; a 4-spindle drill that sold for $1000 two months back is now tagged at $800.
- **Red China is sending a technical trade mission to London this month** to look into technology and operations in the machine tool, agricultural, textile, electronics, mining and precision instrument industries. British businessmen reportedly initiated the exchange of trade missions.
- **Reasons for the decline in captive steel foundries over the last 15 years** (then they turned out 50% of all castings, now they make maybe 25%) **is being investigated** by the Steel Founders' Society of America. One theory so far: technical advances today make use of independents more economical.
- **West Coast aircraft engineers who have been put out of work** by defense cutbacks are accepting jobs at lower pay outside the aircraft field, rather than take a job that might be terminated by another cutback.
- **New body-dip painting process that rustproofs bodies inside and out** is being used in production of 1958 American Motors cars. The process, used extensively in Europe, but never here, involves submerging the entire car in a rust-preventing primer.
- **Aircraft parts as large as 60 ft x 12 ft can now be chemically milled** in a new vertical tapering facility at US Chemical Milling Corp, Los Angeles. The vertical process will permit application of chemical milling to a much wider variety of aircraft parts, and it will eliminate gas accumulation, one of the worst bugs in conventional horizontal etching baths.
- **Estimated effects of the six-weeks-long IAM San Francisco area strike:** $15 million in lost wages; 1500 other-union members who honored IAM picket lines and 1000 other workers laid off—in addition to the 7000 IAM strikers. One bright spot: cut-back defense subcontractors had a chance to get out and look for new business without maintaining heavy payrolls.
- **If your steel supplier has been advising you to order now** for fourth quarter delivery of cold-rolled, hot-rolled and silicon sheet to avoid shortages later, pay no attention. A top steel executive assures us "It's strictly a sales pitch. There isn't a Chinaman's chance of a shortage this year."
- **IBM has come up with an assembly machine that "takes orders from itself."** When a change in layout and components of a panel is called for, the machine (which fastens resistors, capacitors and other electronic components to a printed circuit panel) takes its instructions from IBM cards, then automatically resets itself for the new assignment. When it's marketed, the machine will insert one component per minute, will cost $100,000.
- **Cold-coated engine shrouds may help cool supersonic aircraft** as they race to challenge the thermal barrier. Gold coating process, developed by North American Aviation, allows brushing, spraying or dipping of 0.000,025 in. to 0.000,01 in. coating onto the metal shroud. Gold (silver can be used, too, but it's not as good) reflects the intense heat away from vital parts.

## Spot index to major News stories...


Pentagon Deals More Cutback Blows ..... 174
Settle West Coast IAM Strike-Lockout ..... 174
Lincoln Opens Its Unitized Body Plant ..... 176
Charge Pentagon with Big Business Bias ..... 177
Foreign Report .... 181
Field Report ..... 178
Washington ..... 103
Detroit ..... 105
Aircraft & Missiles 107
Machine Tools .... 109
What's Ahead
in Metalworking 111
in Business .... 112
Surplus Machinery
Market ..... 336




Close-up view of Ex-Cell-O Precision Boring Machine equipped with a single spindle and a universal fixture for small lot production.

2112-B single-end Ex-Cell-O Precision Boring Machine with horizontal cross slide fixture.

1212-B double-end Ex-Cell-O Precision Boring Machine with universal fixture having cross and vertical slides.

# These versatile machines keep busy

## Ideal machines for toolroom work and short production runs

These Ex-Cell-O Precision Boring Machines equipped for general-purpose work perform precision boring, turning, facing and chamfering operations quickly and economically.

They can be operated automatically or manually. Spindle speeds are easily changed through variable speed drives. Universal fixtures rigidly hold tools and workpieces of many sizes and shapes. Horizontal and vertical slides of the fixtures permit precision positioning of either tools or work.

Ex-Cell-O makes a complete line of versatile precision boring machines.

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DETROIT 32, MICHIGAN MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

56-63

# Washington ... NEWS REPORT

## Administered price probe . . .

The administered pricing inquiry is just beginning. Senator Estes Kefauver's hearings with U S Steel, in recess now, will resume in October with Bethlehem Steel and other companies, as well as with steel users.

**Meantime,** the Commerce Dept is gathering a set of statistics for the Joint Economic Committee on fluctuations in prices among some 2000 commodities. What the Committee wants to learn is just how frequently prices change. It will look into (1) prices that change frequently (and so are regarded as set in the market place), (2) prices that change from time to time (and so could be judged as having been set by both supply and demand and management decision), and (3) prices that change infrequently (and so are labelled as administered for reasons other than market demand and supply).

**The Joint Committee's project** is billed as a "scholarly study," but certainly Kefauver will take advantage of the statistics when he resumes.

## Ruckus over defense policy . . .

Russia's recent announcement of a successful ICBM test launching—beating the U S to the punch—puts the administration's big round of defense cutbacks (see p174) in a new light. It has generated demands—notably from Senate Democrats like Henry Jackson and Stuart Symington—for a new review of defense policy.

**Actually, Pentagon intelligence has known** of Soviet ICBM launchings for at least four months. U S electronic detection sites on Turkey's Black Sea coast have been picking up signs of long-range ballistic missile firings—aimed to the northeast—from Soviet launching centers in the southern Ukraine.

**Because of the official belief** that the Russian successes in ICBM tests do not change relative U S-Russian military positions, it's unlikely that Pentagon policy will be revamped.

## Army cutbacks, too

On another critical front, new Army cutbacks—another division and two missile support commands and more to come—are stirring up controversy (much of it within the administration itself) that U S military strength has become geared to fight only all-out nuclear wars at the expense of the more conventional forces that fight local "brushfire" wars.

**Last month, for instance,** Washington heard a rash of rumors that the National Security Council is considering changes in U S defense strategy to put a new stress on preparedness for limited war. The source of the rumors: a background briefing for six newsmen by a top-level State Dept official.

**But the latest Army cutbacks**—50,000 men so far—added to upcoming reductions in the size of the Tactical Air Command, apparently put the kibosh on any important change.

## Lid lifted on export data . . .

Export trade statistics will be more accessible as a result of a new Treasury Dept ruling worked out at the insistence of the House Government Operations Committee.

**Since World War II,** individual shipments of goods overseas have been held secret. Commerce put out broad general monthly summaries, but no more. Now the Customs Bureau has promised to release such data as quantity, type, destination of every shipment that leaves a U S port—after the information is screened on a security count.

**This means that any interested party,** by paying Customs part of the cost of compiling the data, can find out who ships how many machine tools or any other item to what export destination.

**The House Committee is now turning its attention** to import figures. Staffers say they will try to get another ruling requiring more detailed reports on incoming shipments than are now published.

## They're listening to Reuther . . .

Government people take seriously Walter Reuther's offer to modify union wage demands if auto manufacturers will reduce list prices by $100. Their reasoning: such a proposal is easy to understand, and the car makers will live to see the idea raised again when the United Auto Workers start bargaining on the 1958 contract.

**The four-day week will be Reuther's No. 1 demand.** And he will seek higher pensions, more unemployment pay. Those are the concrete demands that show up in dollars and cents.

**But equally as important** over the long pull is this: when Reuther threw out the idea that a union leader had some right to discuss the pricing of a product, he was asserting the idea that the price of a car is bargainable. Reuther has been charged before with trying to meddle in management's affairs—but never before has his proposal been so concrete.

# PRECISION PERFORMANCE...

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To tap users, precision performance means production-line continuity, better threaded parts, increased tap life . . . and BAY STATE!

## BAY STATE TAPS

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# Detroit ... NEWS REPORT

## Tooling and prices at Ford . . .

Ford is going to spend just about the same amount of money in tooling up its 1959 models as it did this year. That's Ford's way of saying that facelifts are a thing of the past, and from here on out you'll see completely, or at least drastically, restyled cars every year. The public, said Ford Chairman Ernest R Breech, wants an all-new car every year. And if that's what the public wants, Ford will give it to them. This year's capital goods and tooling expenditures at Ford Motor Co will run slightly less than 1957's $680 million.

**The 1959 figure is slightly less,** with the cutback in capital goods rather than tooling.

**Meanwhile,** Ford, despite the much-publicized offer of Walter Reuther to hold down wage-hour demands next year if automakers would cut prices $100 per car, will increase its prices $100 rather than lower them that amount.

**This is no surprise to Detroit,** where rumors of a price increase by the Big Three have been floating around for several weeks. It's fairly certain that the rest of the automakers, at least the other two of the Big Three, will follow suit.

**At press time, Reuther,** stung into further action by Ford's abrupt rejection of his $100 reduction proposal, indeed by Ford's diametrically opposite $100 price increase, promised that UAW won't give up the "fight against inflation"—that it would make a detailed analysis of the "false allegations made in the letters of the three companies."

## Changeover time . . .

Autodom's Big Three, except for Ford's new Edsel Division, are currently shut down for changeover to the '58 models. The Little Two, faced with the job of filling dealer pipelines with a relatively small capacity, closed down earlier and by the week of August 26 were in production on '58 models. Willys, too, at that time resumed truck and jeep production at Toledo after a three weeks' "vacation."

**The new Edsel is now in dealers' showrooms** and is coming off assembly lines at a 5000-plus-units-per-week clip. But newspaper people, who had a preview look at the Edsel late in August, were generally lukewarm toward it, said it borrows too heavily from 1957 Fords and Mercurys, although others thought lack of fins and the vertical radiator grille to be a welcome departure from the commonplace.

**That's no guide to public reception** of the Edsel, which has often been diametrically opposed to "expert opinion."

## Gas turbine lies doggo . . .

After great hoohaw and publicity, six months have gone by with nary a whisper in the press about the gas turbine for autos. Reason seems to be that now that the Big Three has gone through the initial fanfare, it's time to settle down to the business of readying them for production.

**Most likely to succeed** in getting out the auto turbine first is Chrysler, whose George Huebner (the man responsible for the first regenerative model) says his department is a beehive of activity. And he still finds no reason to change his prediction that turbines will be commonly available in autos by 1965. Not only that, the turbine could well be offered much earlier on top lines.

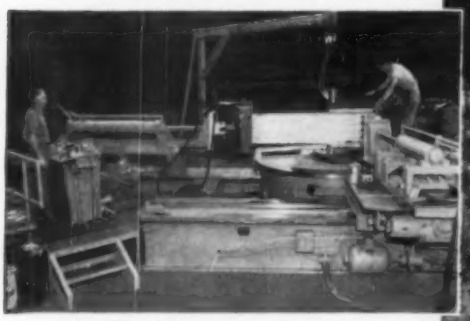
**Ford is still all wrapped up** in turbine material problems, but its program has been stepped up and its research staff expanded. One reason for the race to be the first on the market with a practical gas turbine, as advanced by Ford engineers, is that today's all-new internal combustion engines now have a projected market life of five years, versus nearly double that just a few years back. Ford plans new orthodox engines across the board on its 1958's. Add five years to that date and it begins to look as though Ford will come up with something radically new in 1963—very possibly the gas turbine.

**General Motors is still eyeing the free-piston** version of the gas turbine hopefully—mainly because it doesn't require high-priced materials to lick the problem of extreme heat in the final stages of combustion. So far GM's only commercially efficient effort will cross the ocean soon as the powerplant for a Liberty ship. But if you want a gas turbine, GM will sell you one anytime. Trouble is, GM's own system of protocol is delaying development of the gas turbine. It seems that applied research at GM is a function of its operating divisions, and so far no division wants to lay out the money.

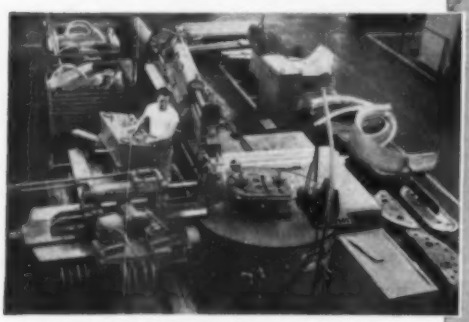
## Galaxy of gadgets . . .

**This year offers an exceptional array** of things the well-dressed car will wear—tachometers; built-in consciences for your speedometer, ranging from a red glow to Bermuda bells; warning lights (particularly in the case of the Edsel) to supplement virtually every instrument on the dashboard—and our favorite: a radio that automatically hunts up another station when the one you're listening to goes off the air.

**AT CONVAIR.** This Model CF 25-50 Bath Radial Draw Former has produced hundreds of titanium and other critical parts for the F 102A and other programs at Convair.



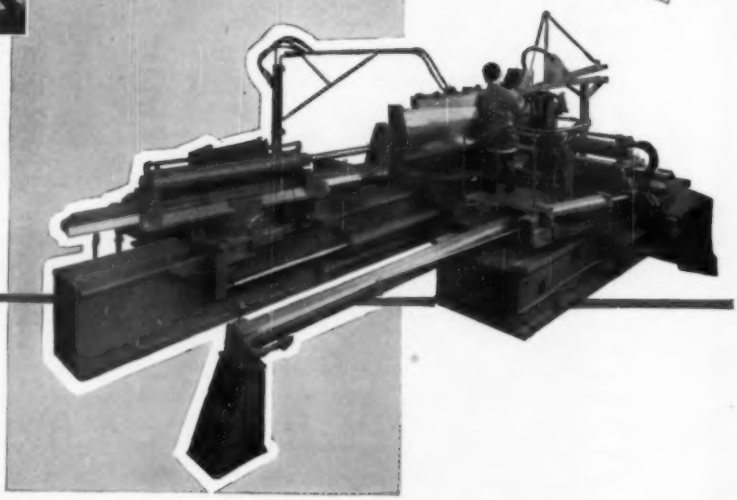
**AT DOUGLAS.** Anti-icers, retainer seals, canopy rails, and many other parts for RB 66C, B 47 are Radial Draw Formed. DOUGLAS-TULSA STAFF PHOTO.



**AT MARTIN.** This Model CF 12 1/2-25 Bath Radial Draw Former forms titanium, stainless and aluminum parts for many of the Martin airplane and missile programs.

# AIR PROGRESS THAT FIRES THE IMAGINATION . . .

## . . . and BATH radial draw formers are playing an important part



Great credit is due the aircraft, jet and missile industries for their fantastic progress in the last few years. The Aircraft Industry has taken us through the sonic barrier into the thermal thicket . . . truly, progress that fires the imagination. The titaniums, the inconels and other tough metals needed for this air progress yield best to forming by the BATH combined stretch and compression methods of Radial Draw Forming. One-piece construction in parts involving compound contours or changes in cross section throughout the contour have become possible with consequently greater strength and reduced weight.

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A Catalog describing the facilities of the Contract Forming Division is also yours for the asking.

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Press Brakes • Tangent Bending Sequence Presses • Press Type Brakes • Special Machines

# Aircraft and Missiles...

NEWS REPORT

## "Changeover Blues"...

Now it looks as though that old Detroit bogeyman, the changeover, has moved into the aircraft industry, bringing in his wake the twin spectres of gloom and unemployment.

**It's said that out in Los Angeles today** you can't see the smog for the gloom, and as one engineer puts it, "We used to whistle when the boss's secretary came down the aisle. Now we cringe."

**There's no gainsaying** that two factors are combining to throw the aircraft industry into a turmoil—defense cutbacks and long-range plans to convert the military aircraft industry from "mostly planes" to "mostly missiles" by 1960.

**The current round of defense cutbacks,** when you examine it closely, doesn't deserve the tremendous amount of publicity it's been getting. In all, the cutbacks amount to $2 billion or so out of $40-plus billion—and that leaves a lot of money for the aircraft industry to play with.

**But the changeover from aircraft to missiles** is a far different thing. It's not just a matter of a few weeks, as in the automobile industry, but a long-range, far-reaching policy that will uproot many aircraft people before it's over. Defense Dept officials now estimate that 100,000 of the industry's employees will be laid off before year's end as a result of cutbacks and the changeover.

**It will eventually mean higher labor** productivity, more special machines, and in all probability a permanent reduction in the number of production workers employed by the aircraft industry—even though missiles will one day be made in larger quantities than planes are today.

**But until the aircraft industry** makes the changeover, there's little doubt that such areas as Los Angeles, San Diego, Seattle and Long Island will see some fairly drastic employment cuts.

**But at the same time,** a new aircraft and missile industry is springing up in the South—in places like Winston-Salem, Charlotte and Burlington in North Carolina, and at St Petersburg, West Palm Beach and Orange County, Fla.

**Plants down there are advertising** for all sorts of aircraft engineers, technicians and production people. This could well mean that the aircraft industry's problem over the next few years will be one of relocation rather than unemployment.

## Shakedown on ICBM's?

Washington is taking Russia's firing of an ICBM seriously, but there's no sign that the Soviet success will mean a big step up in the U S program to develop the 5000-mile intercontinental missile.

**The official U S line is this:** the truth of Russia's announcement of the ICBM test firing is accepted. But there's no telling how far the Russians are from volume production of the weapon or how precise the firing was.

**In all the recent defense cutbacks** (see p174) the ICBM has been untouched. It rates top priority and there's no limit on available funds. Of the $2 billion or so now being spent annually on guided missiles, probably half of it is earmarked for long-range ballistic missile projects.

**But critics of administration defense policy** say Russia's ICBM firing is a reason for increasing rather than reducing defense spending. And some authoritative Pentagon sources hint that there's an upcoming shakedown due in the ballistic missile program because "We're spending money like water on it, and we're pushing beyond what is practical." In line with this thinking is the anticipated dropping of one of the two current U S IRBM projects.

## Cutbacks hit parts makers...

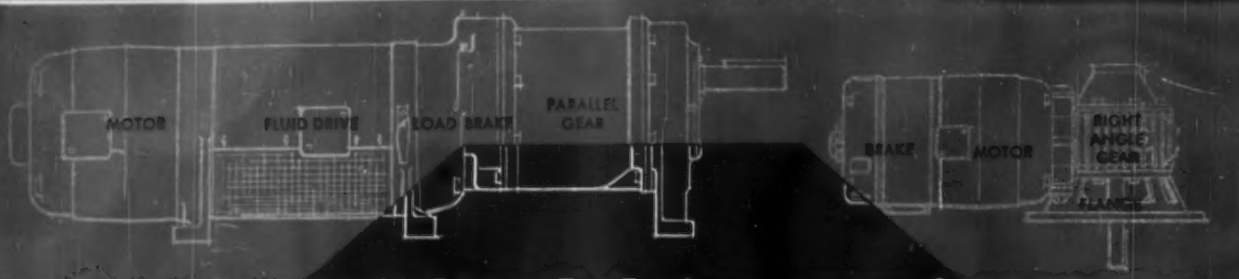
A lot of real concern is beginning to show up now among aircraft parts makers because of the recent cutbacks in defense orders.

**For one thing, profit margins are going down.** Say a parts maker has a contract for 1000 parts, had planned to make 500 a month for two months. Then along comes an order to stretch out the contract over six or seven months. Now, instead of two good solid production runs the company has six or seven very slow ones. That adds up to high production costs in anybody's books, especially when there's no readjustment of original contract.

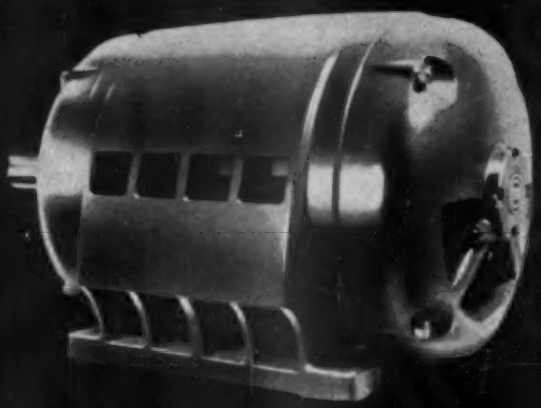
**Subcontractors, too,** are being pushed out in the cold, with primes pulling business back into their shops as stretchout orders come through. **This is particularly noticeable in engineering** and experimental work. As one big subcontractor puts it, "All we know is that we are still bidding on such jobs but we aren't getting any. The assumption is that the contractors are doing it themselves instead of farming the work out."

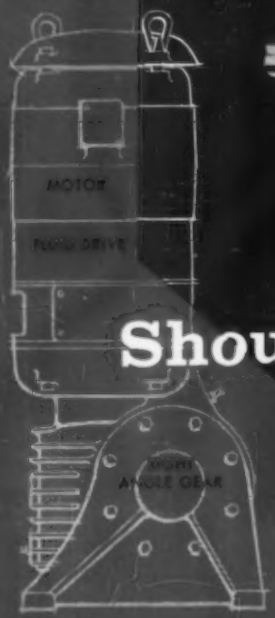
**Reports** from two of the nation's biggest aircraft parts makers indicate that one, making production cutbacks already, says "indecision in Washington" makes it impossible to tell how many more it will make before things level off.

**The other says it has arrived** at a "reprogramming level"—a sort of shaky plateau—after laying off nearly 500 workers when the cutbacks first sifted down to the parts making level.

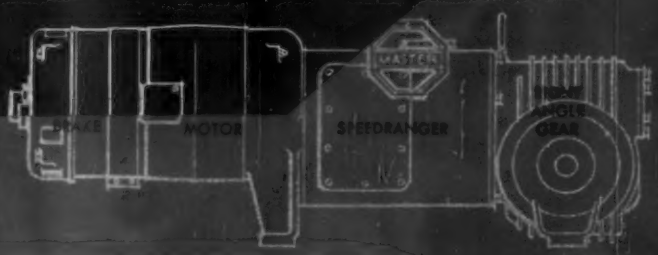



# Your specialized drive requirements






# Should meet their Master

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**MASTER ELECTRIC MOTORS**

**THE MASTER ELECTRIC COMPANY, Dayton 1, Ohio**

# Machine tools ... NEWS REPORT

## Attitude toward Red trade shifts . . .

Don't look for any important pronouncement from Washington about a change in attitude toward selling machine tools to Communist countries.

**A change is in process,** nevertheless. Our new policy—modified is a better word for it—will be spelled out in individual cases, as they arise. The policy may not appear to have any consistency or continuity.

**Washington may deliberately inject** a certain amount of confusion into the situation so as to keep everyone guessing, especially Communists.

**Poland is the first country to be singled out** for special treatment. But there is not likely to be any front-page splash about it, if Washington can help it. Many items, perhaps including machine tools, will be allowed to be shipped to Poland by U S companies.

**Whether any Polish orders will develop** is another story. Does Poland have money to spend on machine tools coming from this country?

**Tokyo is reported to have told** Japanese machine tool builders that they will be allowed to ship to Red China the same types and sizes of machines that Britain now permits.

**Meanwhile no change will be made** in the stringent ban on shipments of critical machine tools from this country to Russia or China.

**Non-critical machine tools,** however, have a good chance of being licensed for export to iron curtain countries, except China. But applications, before being granted, will get a first-class looking over in Washington.

**Washington still is under relentless pressure** from our allies to relax its rigid attitude in opposition to sale of strategic machine tools to the Communists. The proposed relaxation would take the form of slashing to a relatively few items the types of machine tools that cannot be shipped to Russia and her satellites.

## Government tool disposal policy . . .

With some 18,000 surplus machine tools slated for disposal by the government in the period 1955-1959, this is a good time to take a look at how it's done.

**First, a military service declares** the equipment is in excess of its requirements. Itemized descriptions go into the *"Excess Property List,"* which is sent to the Navy's Materiel Distribution Division, Bureau of Supplies and Accounts—the clearinghouse for *all* excess military equipment. The Division then circulates the listing to all Defense Dept agencies to determine whether other service branches can use the equipment.

**This screening lasts 45 days.** Then the list goes to other federal agencies for 90 days. Tools not picked up by any service become surplus.

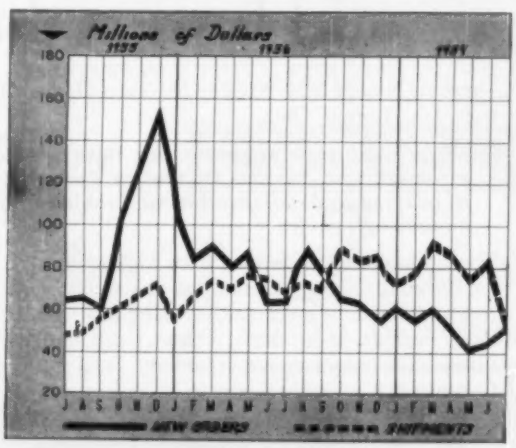
**Then disposal lists are reviewed** by ODM and by BDSA's Metalworking Equipment Division, to prevent "an adverse market impact of bulk surplus tool sales." ODM and BDSA tell the Defense Dept when and how to hold the sales.

**When at least 400 tools are ready to go** on the block in a single sale, BDSA calls in an advisory group from industry—a builder, a distributor, a used tool dealer, and a tool user—to look them over. Their recommendations are part of the final proposals for the Defense Dept.

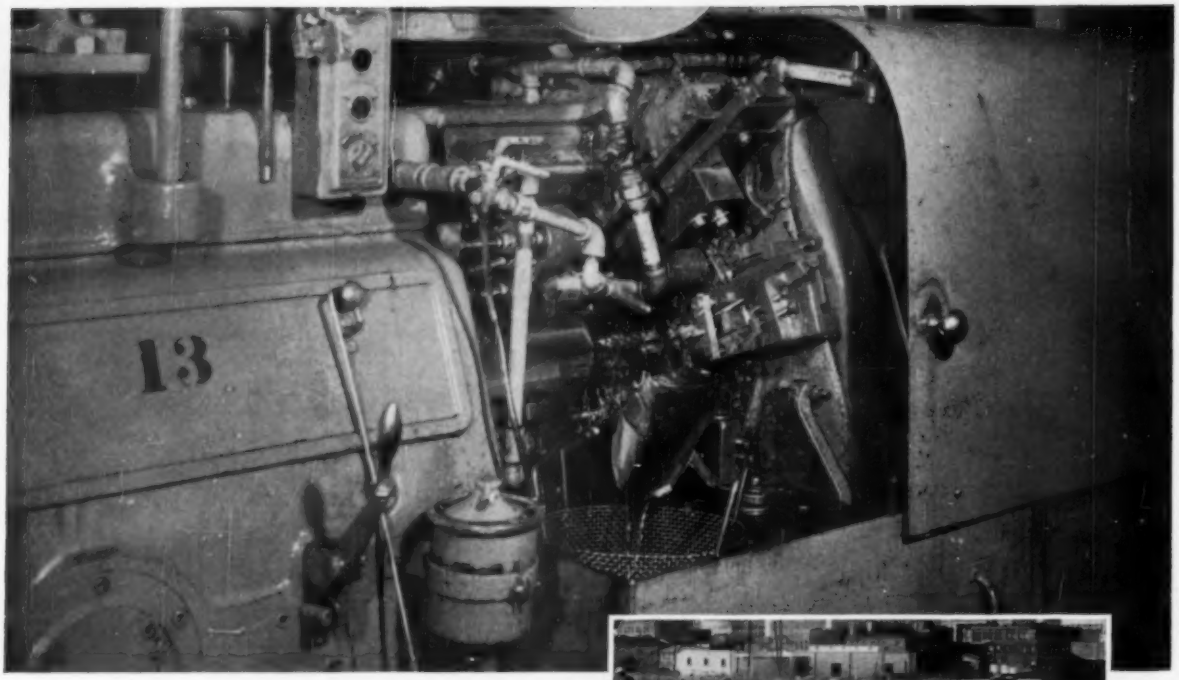
**In the last 2½ years,** the services have put up about 6000 surplus tools for disposal—all either more than 15 years old or single-purpose items —and BDSA has ordered 200 withdrawn.

**Next, the military service advertises** the auction and invitations to bid are sent to people on an official mailing list. A specified sale date is set, and 15 days are allowed, usually, for inspection of equipment. Sales are by sealed bids.

**While tool disposal is decentralized,** the Air Force does maintain a central mailing list. To get on it, write National Bidders' Control Center, PO Box 286, Kelly Air Force Base, Texas. Ask for AMC Form 88. For the other services, write to the nearest Continental Army Command or District, attention Surplus Disposal Officer.




**MIDSUMMER ORDER CLIMB of 30%** in July over June was recorded on the National Machine Tool Builders' Association Index. While July new orders rose to $55.86 million, shipments for the month dropped to $58.5 million, bringing orders and shipments more into balance. Industry backlog at July's end: 4.2 months




Nelson uses a battery of National Acme multiple spindle automatics, Brown & Sharpe single spindle automatics, and many Nelson Vertical single spindle automatics for threading and boring its end welding studs. Various stainless and 1015 to 1020 steels are used. Each machine has rack for handy storage of steel bars. Coolant is *Texaco Transultex Cutting Oil.*

Bridge of composite construction, showing Nelson end welding studs fastened to I beams, ready for pouring of concrete. Studs of many sizes and shapes are flux-filled—welded with semi-automatic Nelweld gun.

# "Changing to Texaco upped production and lowered maintenance costs"

—reports Nelson Stud Welding Division, Gregory Industries, Inc., Lorain, Ohio.

**"Your lubrication engineer was right when he recommended *Texaco Transultex Cutting Oil.* It has reduced our machining problems to a minimum."**

This customer manufactures studs for end welding. They are forced to choose materials for weldability and service, regardless of their machinability. And this often presents tough production problems. At least it did, until a Texaco Lubrication Engineer recommended *Texaco Transultex Cutting Oil.*

After switching to Texaco, the customer reports, "Production has increased beyond our expectations, and maintenance costs have been substantially reduced." What's more, machines now stay cleaner, shop housekeeping is made easier.

Let your local Texaco Lubrication Engineer help you select the best cutting, grinding or soluble oil for top efficiency at lowest cost. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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TEXACO **TEXACO** CUTTING, GRINDING, SOLUBLE AND HYDRAULIC OILS

# What's ahead ... in Metalworking

NEWS REPORT

## Fall upturn should be here soon . . .

Now that Labor Day is here and gone, vacations are over and industry is doing its traditional rolling-up of sleeves in preparation for the solid months of production, all signs point to a metalworking upturn in the next few weeks. But at the moment, it's purely a watch-and-wait proposition.

**Stamping people,** for instance, expect a good business pickup within 60 days at most. But so far a predicted stepup in orders has failed to materialize. Biggest business stimulus will come from Detroit when new models come out.

**Foundries, another basic industrial bellwether** of business to come, are watching the automotive and appliance industries for signs of an expected pickup in new orders. Gray iron casters figure they'll wind up 1957 with a production figure 10% below that of last year.

**Incidentally,** look for prices of gray iron castings to go up about 5% very soon—it'll be a pass-on of rising labor costs mostly. Steel castings, too, will go up in price—about 6%.

**Tool and die business is fairly slow and spotty** —with the auto industry the most conspicuous soft spot. Seems that orders for the 1958 models have already been delivered and no one knows what 1959 models will bring in the way of tooling orders.

**Steel production is showing** some signs of recovery from the summer dog days, with national average capacity climbing a percentage point or two each week above the 80% mark.

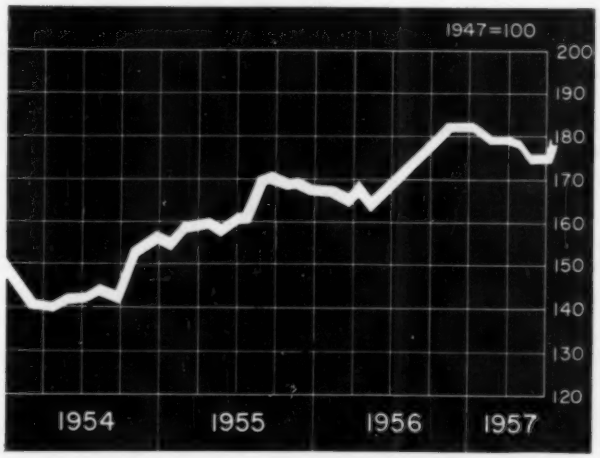
**One very good business sign** reported by a steel producer is that summer's end has marked a big increase in the number of individual orders received from a "highly miscellaneous" cross-section of metalworking.

**Steel orders from appliance makers,** for example, are beginning to firm up as new models move into the production stage. The appliance makers, who have spent several months working off inventories of raw materials as well as finished products, should be back in the market for steel soon.

**Steelmakers, like the tool and die people** and the stamping people, list the auto industry as their biggest question mark—when will the automakers scrape the bottom of their inventory barrel and start buying steel in quantity?

**One reason advanced for the delay** in auto industry steel buying is that Detroit this year is ignoring last year's 45-day lead-time for major steel orders on the theory that today you can get all the steel you want when you want it. Steel people figure the automakers can't hold off buying much longer—particularly ones like the major manufacturer whose 1957 production is off 9% but who cut his steel buying 26%.

**Steel warehouse stocks** are still moving fairly slowly, awaiting a pickup later this month. Inventories of everything except heavy plate and wide-flanged beams are at 6-months-of-current-shipments-levels—and that's above normal. Steel warehousers are keeping a wary eye on the hard-hit aircraft industry, which is a particularly good stainless customer, but so far no drastic curtailments in aircraft orders have been reported.




179

**AMERICAN MACHINIST INDEX OF METALWORKING PRODUCTION**

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

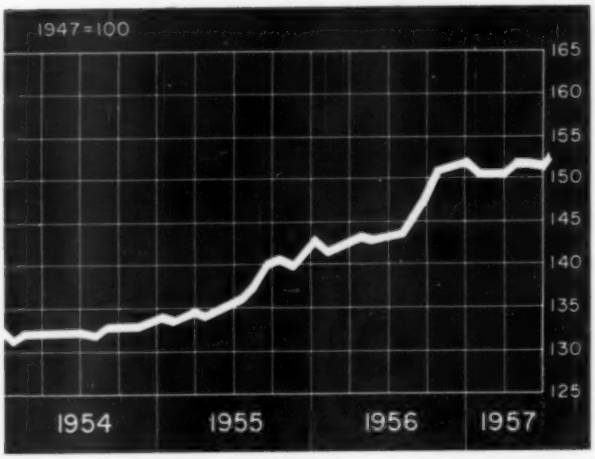
| | AUG. Estimated | JULY Preliminary | JUNE Revised | JULY Year Ago |
|---|---|---|---|---|
| **Total Index** | **179** | **178** | **177** | **170** |
| **Machinery** | **153** | **151** | **153** | |
| **Electrical Machinery** | **217** | **210** | **209** | |
| **Autos** | **114** | **120** | **107** | |
| **Other Transportation** | **373** | **376** | **335** | |
| **Other Metalworking** | **148** | **145** | **138** | |

NEWS REPORT

# What's ahead: . . . in Business

**AMERICAN MACHINIST INDEX OF METALWORKING PRICES**

| | AUG. Estimated | JULY Preliminary | JUNE Revised | JULY Year Ago |
|---|---|---|---|---|
| **Total Index** | **152.7** | **152.5** | **151.9** | **144.6** |
| Metalworking Machinery | 177.3 | 176.9 | 165.8 | |
| Other Machinery exc. Electrical | 161.3 | 160.8 | 152.6 | |
| Electrical Machinery | 155.0 | 154.3 | 143.0 | |
| Fabricated Metal Products | 143.9 | 143.2 | 137.6 | |




## Manufacturers optimistic over fall prospects . . .

More new orders, higher dollar billings, increased production and higher before-tax profits are expected this fall by most of the nation's manufacturers. Those are the findings of the National Industrial Conference Board, which has just surveyed the business outlook of 205 manufacturers.

**Especially inclined to look on the bright side** of the coin are control and instrument makers, hardware producers, and manufacturers of electrical machinery and office equipment. On the optimistic side in their outlook, too, are nonferrous metals producers, apparel manufacturers, and the makers of construction materials and paper and allied products.

**Prime worries of most executives today** are the squeeze on profit margins, and tight money. The government, aside from a slight letup on housing loan conditions, has little or no intention of loosening credit pursestrings in the foreseeable future. In fact, even the Democrats have abandoned the subject as a pet whipping boy.

**Price cutting has become a headache** in some industries, and so has overproduction.

**But offsetting these hazards** of the industrial and business worlds are expectations that dollar value of new orders in the second half of 1957 will exceed those of the first half, even though they may not pour in at as fast a rate as they did at the beginning of the year.

**That of course means that dollar value** of production will go up accordingly during the coming months. Affected in turn by increased production, expenditures for capital goods and equipment will at least hold to first half levels, may very possibly go substantially higher.

**And despite the profits-squeeze bugaboo,** most companies think they'll make more money in the second half than they did in the first—even more than they did last year.

| WEEKLY BUSINESS INDICATORS | Latest Week | Preceding Week | Year Ago |
|---|---|---|---|
| *Business Week* Index of Activity (1947-1949=100)* | 146.8 | 146.4 | 145.7 |
| Steel ingot operation (thousands of tons) | 2,132 | 2,101 | 2,389 |
| Electric power output (million Kilowatt hours) | 12,023 | 12,409 | 11,794 |
| Production of automobiles and trucks | 150,697 | 146,259 | 88,785 |
| Engineering construction awards (Eng. News-Record—millions) | $436.5 | $257.7 | $616.6 |
| **MONTHLY BUSINESS INDICATORS** | **Latest Month** | **Preceding Month** | **Year Ago** |
| Index of industrial production (1947-1949=100)* | 144 | 144 | 136 |
| Index of durable manufactures production (1947-1949=100)* | 162 | 162 | 148 |
| Durable goods manufacturers' sales, millions* | $14,182 | $14,296 | $14,406 |
| Machinery manufacturers' sales, millions* | $ 4,312 | $ 4,354 | $ 4,181 |
| Durable goods manufacturers' new orders, millions | $13,576 | $13,949 | $15,214 |
| Machinery manufacturers' new orders, millions | $ 4,560 | $ 4,136 | $ 4,723 |
| New orders for machinery (except electrical)* (1950=100) | 164 | 144 | 164 |
| New contracts for industrial construction (1950=100) | 151 | 134 | 214 |

* Seasonally adjusted.

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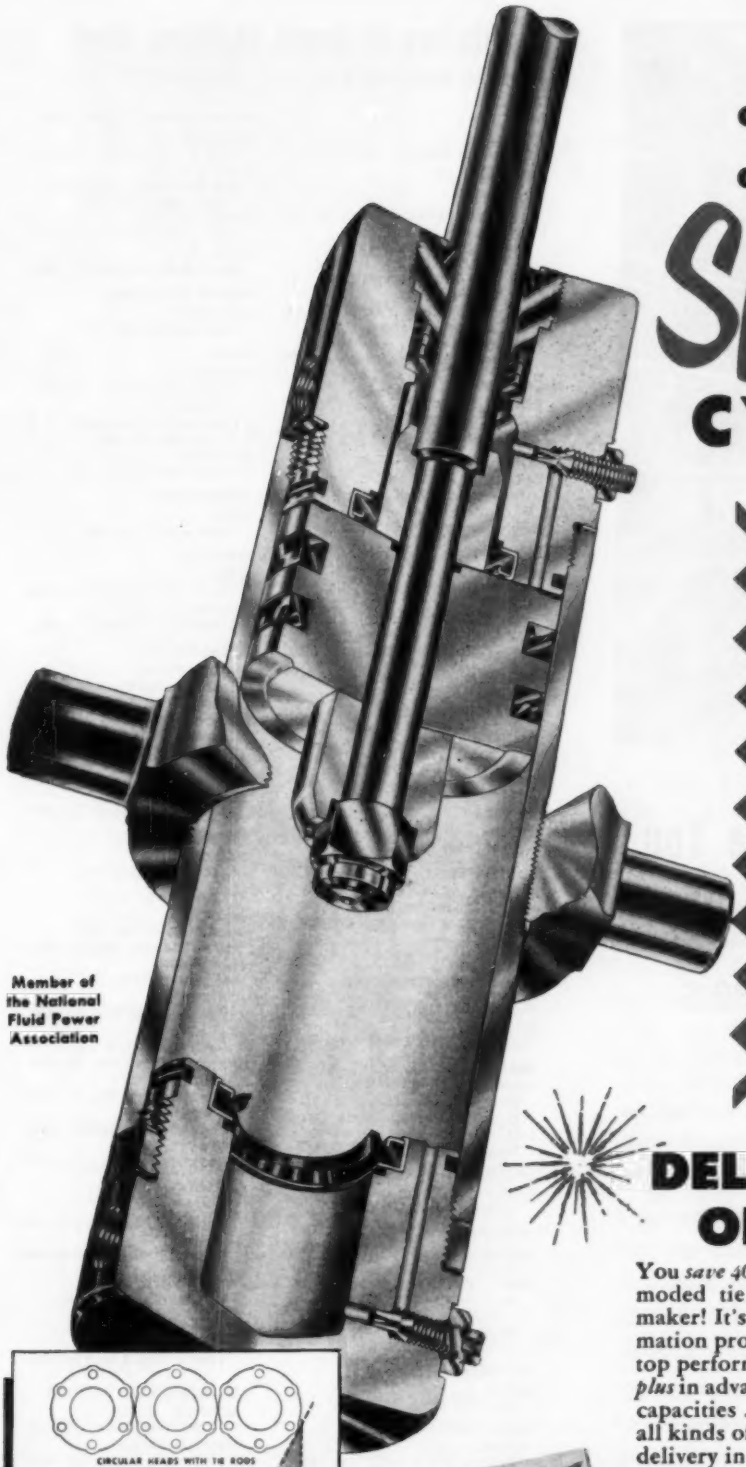

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- **METALLIC ROD SCRAPER,** not just a wiper, actually removes foreign matter from the rod.
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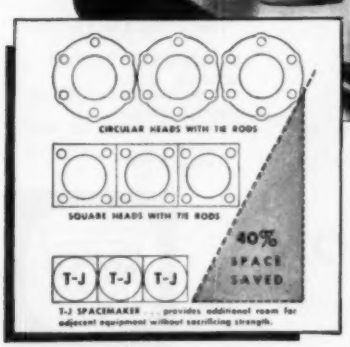
CIRCULAR HEADS WITH TIE RODS
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40% SPACE SAVED
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T-J SPACEMAKER . . . provides additional room for adjacent equipment without sacrificing strength.

## DELIVERY OFF THE SHELF!

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NEW LITERATURE—Send today for new Catalog SM56 with complete engineering details on Spacemaker line. Write The Tomkins-Johnson Co., Jackson, Mich.

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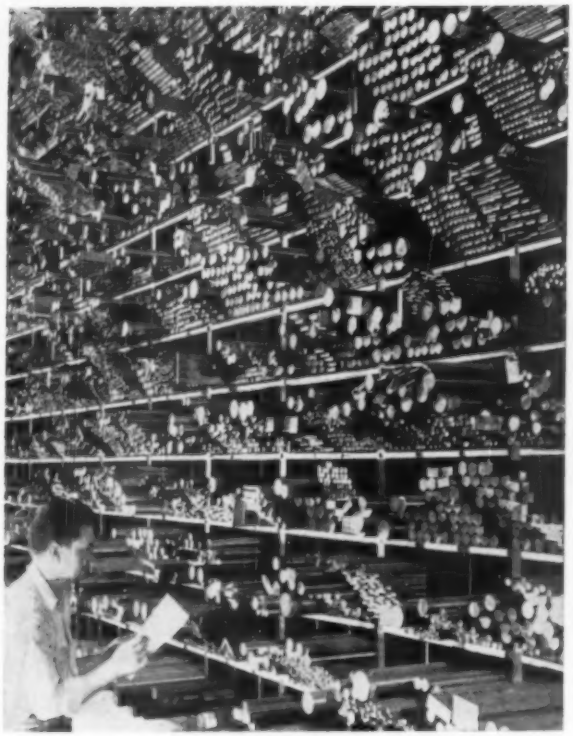

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He maintains a complete stock of standard Armco Stainless Steels. You get quick delivery of the grade, size, shape and finish you need. In addition, your Armco Distributor offers you many warehouse services that help speed production. Mill-trained salesmen are ready to help you select the best grade for the job and provide helpful fabricating information.

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Key: (A) Sheet, Strip, Plate (B) Bar and Wire

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PHOENIX
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**CALIFORNIA**
BERKELEY
Ducommun Metals & Supply Co. (B)
EMERYVILLE
Electric Steel Foundry Co. (AB)
LOS ANGELES
The Cold Metal Products Co. of California (AB)
Ducommun Metals & Supply Co. (B)
Electric Steel Foundry Co. (AB)
NATIONAL CITY
Ducommun Metals & Supply Co. (B)

**COLORADO**
DENVER
C. A. Crosta, Inc. (A)
Metal Goods Corp. (AB)

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The American Steel & Aluminum Corporation (AB)
Peter A. Frasse & Co., Inc. (AB)

**FLORIDA**
JACKSONVILLE
J. M. Tull Metal & Supply Co. (AB)
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TAMPA
J. M. Tull Metal & Supply Co. (AB)

**GEORGIA**
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J. M. Tull Metal & Supply Co. (AB)

**ILLINOIS**
CHICAGO
Central Steel & Wire Co. (AB)
Chicago Steel Service Co. (B)

**KANSAS**
WICHITA
Metal Goods Corp. (AB)

**LOUISIANA**
NEW ORLEANS
Metal Goods Corp. (AB)
The Orleans Steel Prod. Co., Inc. (A)

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AUBURN
Brown-Wales Company (AB)

**MARYLAND**
BALTIMORE
Seaboard Steel & Iron Corp. (B)

**MASSACHUSETTS**
CAMBRIDGE
Brown-Wales Company (AB)
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FALL RIVER
Congdon & Carpenter Co. (AB)

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**MISSOURI**
KANSAS CITY
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**NEBRASKA**
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Gate City Steel, Inc. (A)

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CHARLOTTE
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**OREGON**
EUGENE
Electric Steel Foundry Co. (AB)
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**PENNSYLVANIA**
PHILADELPHIA
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YORK
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MAGAZINE OF
METALWORKING PRODUCTION • ESTABLISHED 1877

# Too Much Capacity For What?

How often have you heard the remark that Metalworking today has too much capacity? Our ability to produce goods has outrun our ability to consume them, the theory goes.

It is easy to trot out statistics to prove the point. The number of automobiles built this year will be far below the number in 1955. Just think of all that excess capacity!

You could go right down a sizable list of metalworking industries and get a result similar to that in the automobile industry.

But if you conclude from your deductions that spending on new plant and equipment is about to nosedive, who are you fooling?

You have proved only one thing: that there is too much capacity for making products of today's design now on the market. And the excess capacity is right now, not necessarily next year.

## But why do you think . . .

metalworking manufacturers are spending so many billions for research and development? Naturally it is to put new products on the market and thereby stimulate and expand sales. It is to make consumers dissatisfied with what they have. It is to make it costly for users to keep using what they have. It is to make it profitable for users to buy the new products.

If new products come onto the market in increasing numbers—and that is the trend—what happens to all the huge existing capacity? It becomes outmoded and obsolete, of course. New brick and mortar may not be necessary. But new tooling will be.

What good are facilities going to be for building reciprocating engines if the demand is for jets and you are not tooled for jets?

The point is that when you begin to talk broadly in terms of too much capacity, it is fair to ask: too much capacity for what?

## It is easy enough to look . . .

at what's happened the past few years and then at today's demand for metal goods and come up with the observation that Metalworking temporarily is overbuilt.

If you set your sales sights with that thought predominant, you are going to be in for some poor times. What's more, you are going to be surrendering at least part of your market to your competitors who perhaps are not as familar as you with the "overbuilt theory."

Spending on capital goods may not rise in the next year quite to the peak attained this year and last. But don't get the idea that it is about to have a sinking spell because Metalworking has too much capacity. The rapidly increasing numbers of new metal products coming onto the market—a trend that will grow rather than taper—are adequate insurance against any substantial downturn in capital spending. In fact, they will be a prime factor in pushing it up to new heights before long.

Burnham Finney EDITOR

The 2510 Series Shear at the left has a capacity of 3/8" x 10' mild steel. The 1410 and 1406 Series Shears at the right have capacities of 3/16" x 10' and 1/4" and 6' mild steel respectively.

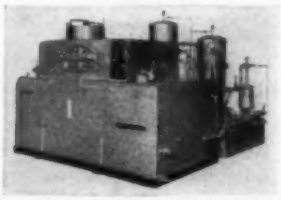
The two 13 Series Cincinnati Press Brakes have a bending capacity of 250 tons. The machine in the foreground is equipped with air-electric clutch control, and both machines are equipped with load indicators.

*Photographs courtesy Detrex Chemical Industries, Inc., Bowling Green, Kentucky*

**DETREX CHEMICAL INDUSTRIES** *say:*

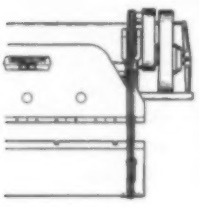
## "Our sheet metal department is built around Cincinnati Shears and Press Brakes"

Three Cincinnati Shears and two Cincinnati Press Brakes are operating profitably in this finely equipped shop. All of the sheet steel parts needed to fabricate an entire line of drycleaning equipment are produced on these versatile machines. The materials range in thickness from No. 16 gauge to 3/8".

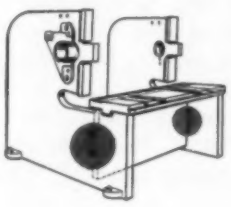


This two-bath Ambassador Model 600S drycleaning machine is typical of the Detrex line of quality equipment produced with the aid of Cincinnati Shaper Company machines.

**Centerline Loading** is a standard feature of all Cincinnati Press Brakes. Since working forces are contained directly in the housings, weaving of the frame and cramping of the ram slides, guides and shaft bearings are eliminated. Centerline loading makes it possible to concentrate most of the weight of a Cincinnati Press Brake in the four main members, which provides maximum strength per pound of machine. Write Department A for Catalog B-5, which gives full details.



**All-Steel, Interlocked Construction** is a standard feature of Cincinnati Shears. All the main members are of rolled steel plate, yet no welds are used as load supports. In addition to eliminating strains which affect accuracy, Cincinnati interlocked construction also reduces freight, foundation and installation costs. Write Department A for catalog S-7R, which gives full details.



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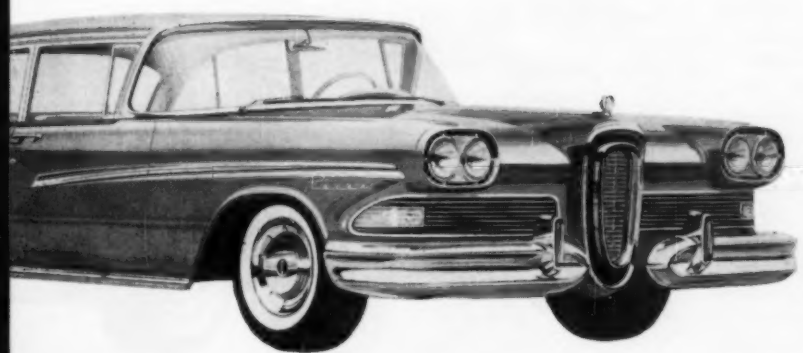
# DETROIT RE-AUTOMATES FOR '58 PRODUCTION, 1

**" . . . you don't mass-produce cars anymore, you mass-produce parts," says one auto executive. But new parts are a natural outgrowth of major changes in the new models, and they, coupled with continued pressure for more efficient production, are the main reason for a big, over-$1-billion, tooling outlay this year. Automakers have developed, built, and bought the most advanced Metalworking equipment available. Here, in the first of a series of articles on Detroit retooling, are examples selected by top auto executives**

GEORGE H DE GROAT,
Detroit editor



Retooling has now become pretty much an annual problem in Detroit. Competition is tougher than ever, facelifting is no longer effective, and the industry must make significant yearly changes in body design, chassis, engines, transmissions, and power accessories. As a result, tooling expenditures this year are just barely below the $1.2-billion record set in 1955, and the trend will probably continue in the future.

The problem is compounded by the fact that few major machines capable of processing parts efficiently are "standard" any more. Most are designed to make specific parts to close tolerances, and their cost is astronomical. Therefore, each year's tooling must be good to pay off in the short time before new product designs make it obsolete. Most current facilities are being replaced before they are worn out or fully depreciated.

### Over-Automation?

Is there a tendency in Detroit to automate everything in sight just because it can be done? No, say automakers, because a great amount of thought must go into the design and application of such equipment to give it as much

flexibility as possible to minimize the yearly retooling problem. Automation can only be applied in harmony with economic principles, which involve the volume of production required and the frequency of design change.

Equipment for parts with a long design life, required in large quantities, can be automated to the hilt; for example, the transmission-pinion lines at Buick and Ford (AM—Aug 1 '55, p111, and Apr 8 '57, p154). But there is a definite limit on versatility when a machine is built to produce a single part—hence Ford's interest in "building-block" machines (AM—July 16 '56, p113).

#### New-Model Features

Options for the buyer will be more varied than ever in '58. In addition to the usual radio, heater, and paint-job elections, he will choose engine, transmission, rear axle, and various power assists. Choices will allow picking a car with economy, economy plus some luxury, maximum luxury, high performance, or high performance plus maximum luxury.

To the production man this means more tooling and more setups to produce more parts of different design than ever. There will be fuel injection, 4-barrel carburetors, superchargers, and new air suspensions. Aluminum is replacing chrome-plated and stainless steels in many non-functional parts, and its use averages 40-45 lb per car. Chrysler sedans average higher—about 100 lb—including extruded window frames and about 35 lb in each automatic transmission. The Eldorado Brougham has nylon coatings on its aircraft-type door seals, and Chrysler uses butyl-rubber window and door seals.

#### How Much Was Spent—and Why

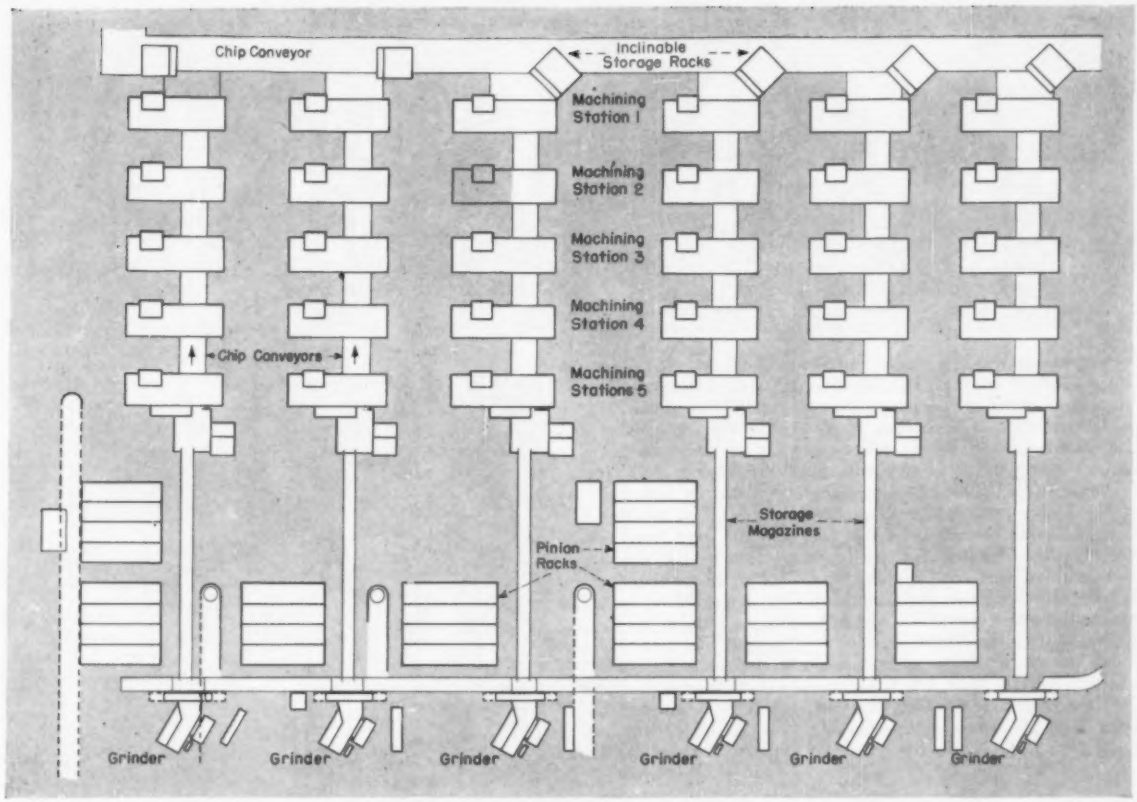
Other design features that affected tooling include integral frame-body construction in both the restyled Lincoln and the new 4-seater Thunderbird, plus refinements in Ford roof lines and rear-fender sculpture. Ford will have new grilles, dual headlights, and horizontal taillights across the rear. The Fairlane series will have a bigger V-8 engine, and the Edsel will sport transmission pushbuttons in the middle of the steering wheel and an engine rated at around 300 hp. In fact, Ford Motor Co spent over $276 million for new tools and facilities for '58.

Tailfins on Chrysler cars are to be brought into closer integration with the total design, among other changes. All models from Imperial to Plymouth will have higher power, revised grilles, dual headlights, new taillights, and new molding sweeps. Tooling expenditures here ran over $200 million.

General Motors put about $500 million into tooling for major changes throughout the line. Buick and Oldsmobile are completely restyled, and Chevrolet will introduce a new model, the Impala, a modified form of the '56 "dream car." Pontiac across-the-board changes include a flat, low hood, larger engine, and optional air suspension. New engines will likely use forged instead of shell-molded crankshafts, and the division will produce a hardtop convertible Ventura model with an extra powerful engine. Cadillac has a new hood, grille, fenders, rear quarter panels, and dual headlights. Air suspension will probably be standard on expensive models; optional on the rest.

#### New Tools

To produce these varied parts, automakers are using transfer machines that permit "scrambled" loading with similar, but not identical, parts. New engine lines have been set up at Ford's Lima, O, plant, Chrysler's Trenton, Mich, factory, and at Oldsmobile and Cadillac divisions of General Motors. Among developments for these lines: Wet CI machining, carbide subland drills (at Cadillac), and wet gundrilling (at Ford) on bolt and valve holes in cylinder heads. Automatic assembly is developing for ball-joint front suspensions and for bushings and needle bearings in pinion gears. Steel-rule blanking dies, cold extruding, and cold forging are being more widely applied. These and other processes, tools, and techniques are described in the series starting in this issue.




**Automated lines . . .** for machining pinion blanks at Sterling are made up of Jones and Lamson Fay automatic lathes connected by automatic handling equipment. Forged pinion blanks enter each of six lines from hopper feed tracks and progress through five machining stations. After the fifth station in each line, part and heat code numbers are automatically rolled into the bearing diameter on the stem and the blank is ejected into floating storage system. This float automatically feeds a Cincinnati grinder, where the thrust face and spline and bearing diameters are ground. Chips in the machining lines are carried through individual chip drag conveyors under the lines to a connecting floor-level system that delivers them to a central point for removal

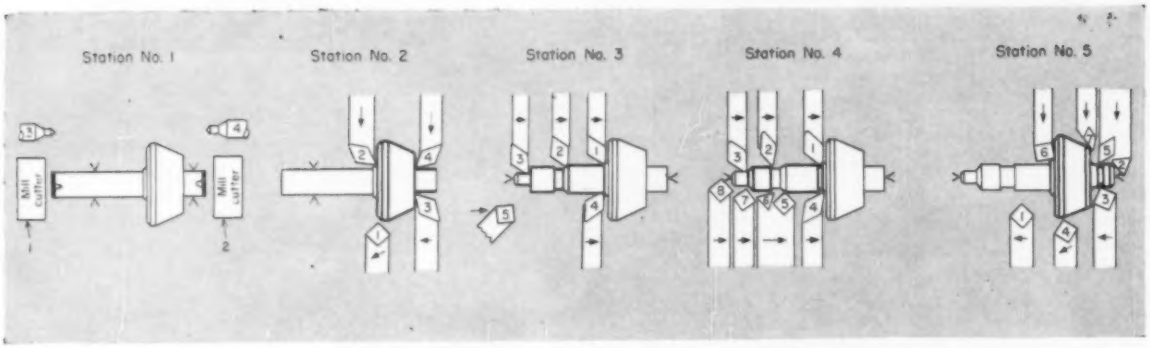
# New tools for FORD'S new Edsel . . .

**. . . are fast and efficient for maximum productivity in making a new line that covers the medium-price field with 18 models, including two- and four-door sedans, hardtops, station wagons, and convertibles. Machines and tooling to produce the new Rangers, Pacers, Corsairs, and Citations, like those for the rest of Ford's line of '58 cars, are the latest and most up-to-date available.**

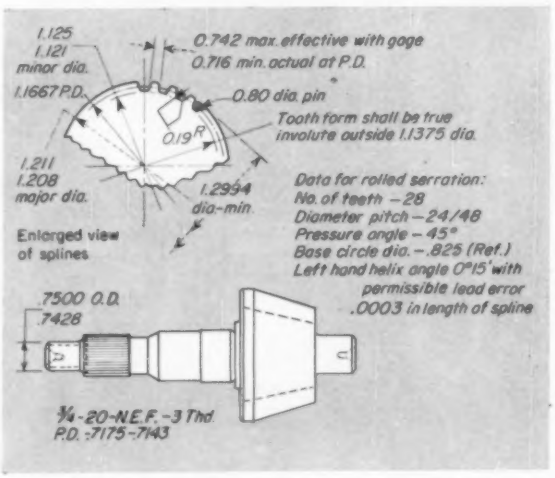
**TRANSFER MACHINES . . .**

. . . for example, permit "scrambled" loading of different parts where machining heads are automatically actuated or cut out—depending upon the part going through. Many include some of the flexibility inherent in "building-block" construction. This permits a more rapid conversion of the machine to accommodate future product-design changes, because major components of the machines can be rearranged or one can be substituted for another.

Such machines are made up of sections consisting of interchangeable main bases, wing bases, vertical and angular columns, and other components capable of being attached to different main bases. Each machine section is provided with its own electrical control panels and mechanical or hydraulic control systems, thus making it independent of other machine sections in the transfer machine. In addition to increased flexibility, these machines are easier to




**New pinion design . . .** requires new tooling. With an added outboard bearing projecting from the face, previous methods of holding and driving the pinion are obsolete. New automatic operations in the J & L lines start with milling the ends to hold 0.004-in. total length tolerances. In the same station, centers are produced in the ends while the work is held at the stem and on the projecting outboard bearing as indicated by V's. Rough turning is performed at station No. 2 on the face angle, outboard bearing and thrust face dias, the front face and the chamfer. Third station is for rough turning the thread and serration dias, recessing the latter, and rough turning the bearing diameter and thrust face. Blanks are held between centers here and throughout the remaining operations. At the fourth station, the thread, spline, and bearing diameters are finish turned, an undercut produced, and the thrust face and chamfer finished. Last J & L operations are to finish turn the face angle, outboard bearing diameter, the large diameter, the front face, and the chamfer. Carbide tools for all operations are automatically actuated into and out of the work as indicated




set up. Any section can be cycled individually and more tool setters can be used at one time to speed putting it in full operation.

#### AUTOMATIC ASSEMBLY

In contrast to this equipment are automatic assembly machines at Ford's Sterling, Michigan, Chassis Parts Div plant. These machines are new to industry, and were developed as an experimental idea for assembling ball-joint front suspension units for the Edsel and other cars. Ford took a calculated risk here in the expectation that this expensive equipment would be amortized before product-design changes occur. Such highly specialized machines cannot practically be designed for ease of changeover in the event of changes in product design. Moreover, major design changes would make them obsolete.

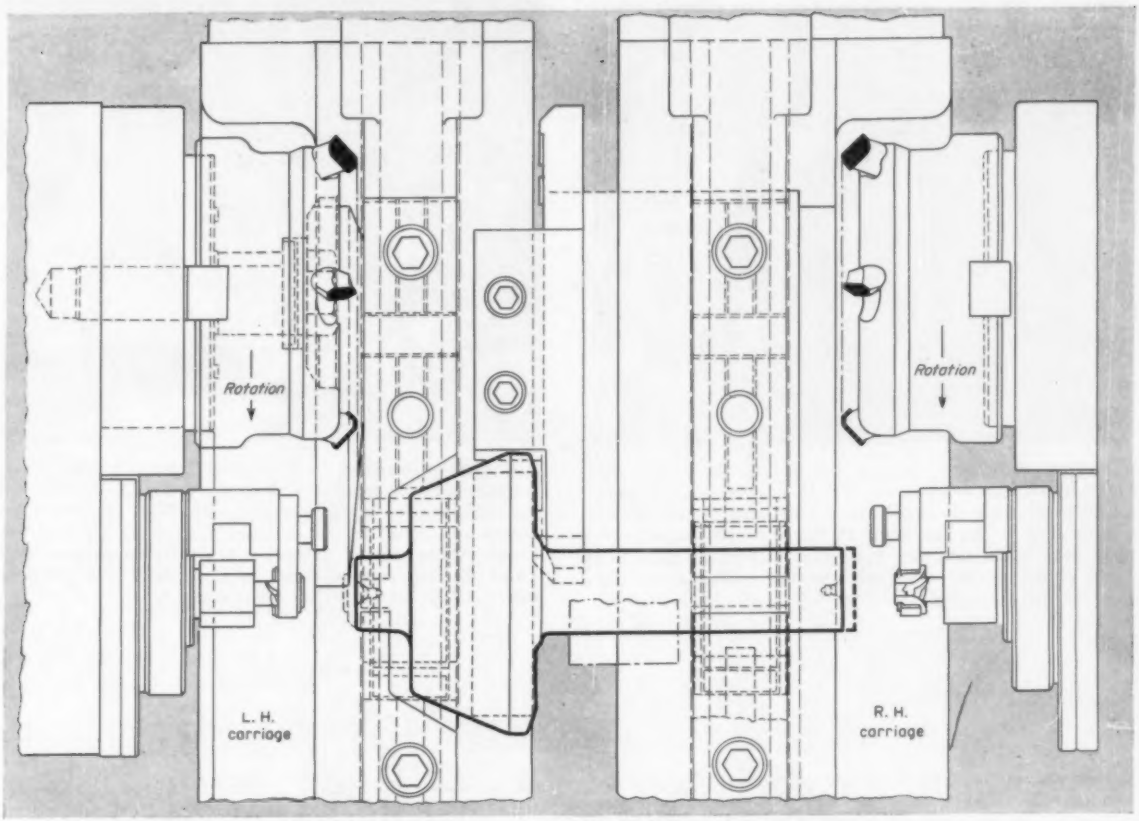
Streamlined efficiency in production is the big advantage gained by this development, however. Two Gilman in-line machines assemble left- and right-hand upper suspension arms—being fed ball-socket assemblies from a third machine, an automatic rotary Gilman assembly unit. A similar arrangement of two Gilman inline assembly machines for left- and right-hand lower suspension arms and a rotary machine for ball-socket assemblies is located in the same area.

#### AUTOMATED MACHINING

At the same plant, redesign of a forged pinion was one of the reasons for replacing individual Fay automatic lathes with six new lines—each consisting of five Jones & Lamson automated transfer machines. Originally, the parts were center-located and stake-driven by carbide chisels in one face. The new design of rear axle features straddle-type bearing mounting so that the new pinions have an outboard bearing extending from this face. With this design, the blanks cannot be held and driven in the old manner. The new setup provides for turning the parts by driving from the stem and the outboard bearing, after they are milled to length and center-drilled on both ends (first of five stations). After other automatic machining operations, through which the pinion blanks are automatically transferred, located, loaded, and unloaded, they are automatically stamped with identification numbers in a Schmidt marking machine. Automatic grinding follows in a special Cincinnati machine at the end of the line.

#### COLD FORMING . . .

. . . is one of the relatively new processes being stressed at Ford Motor Co plants. In addition to spline rolling, which has been employed extensively, cold extrusion is being applied to a number of parts. One of these, at the Sterling plant, is a 1010-steel bearing race for a drive-shaft universal joint, previously made from bar stock in automatic screw machines. Increased efficiency and improved quality are the principal advantages gained by cold extrud-

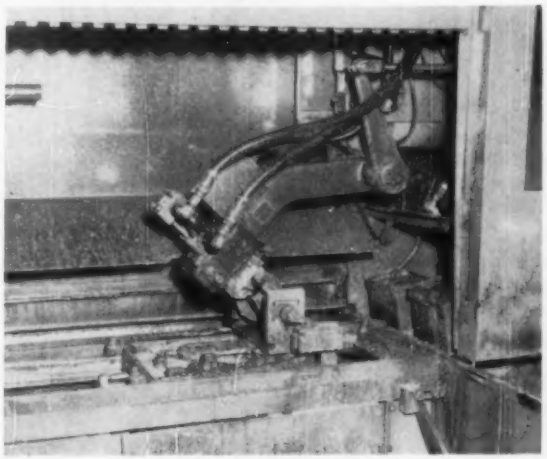



ing this cup-shaped part. However, here again product redesign is largely responsible for the improved process. A crown, or double taper, about 0.0005-in. high at the apex was added to the walls of the cup to keep the needle bearing from climbing in operation. Inasmuch as this design was not practical for parts made in bar machines, cold extrusion was investigated and found to be completely successful.

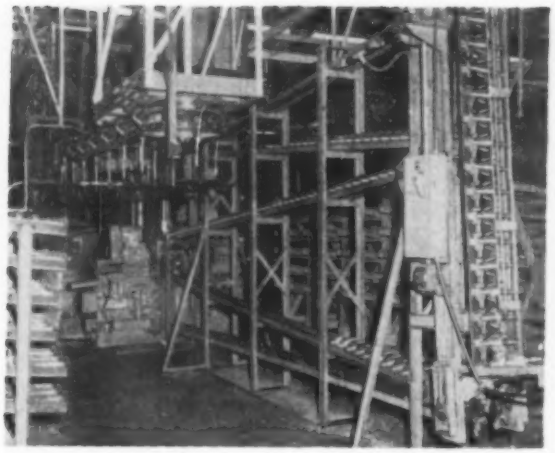
Inexpensive tools are used on 150 and 200-ton inclinable Cleveland presses to cold-extrude blanks of about 1-in. dia and a little over ⅜ in. thick. An ingenious feeding mechanism automatically loads the die, which runs at 25 strokes per minute. Two of these setups are in operation (with a third standing by) to produce scheduled requirements.

At the Rouge Engine Plant, three Verson presses cold-extrude valve tappets to supply 16 per car. Billets are fed to a rotary table at each press where three die stations progressively extrude them. Each press completes two valve tappets at a time.

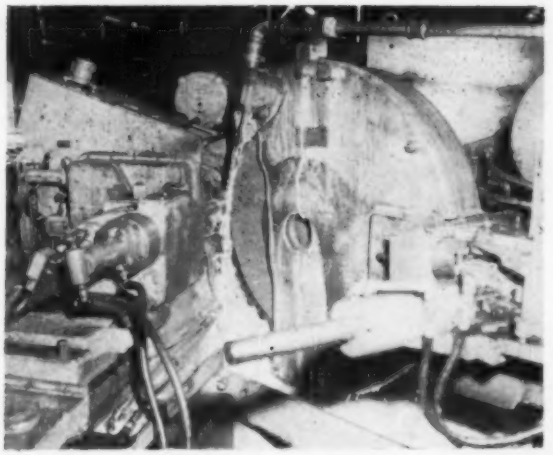
There are four general cold-forming methods now being used. One is backward extrusion, where cup-like shapes are made from solid, cylindrical slugs. The slugs are enclosed in a die and extruded back around a punch that moves forward. In forward extrusion, cylindrical slugs are forced through throated dies of suitable cross-section to produce stepped shafts. A third technique is forward extrusion of stepped tubular parts, and a fourth, cold heading, is employed to expand diameters of parts



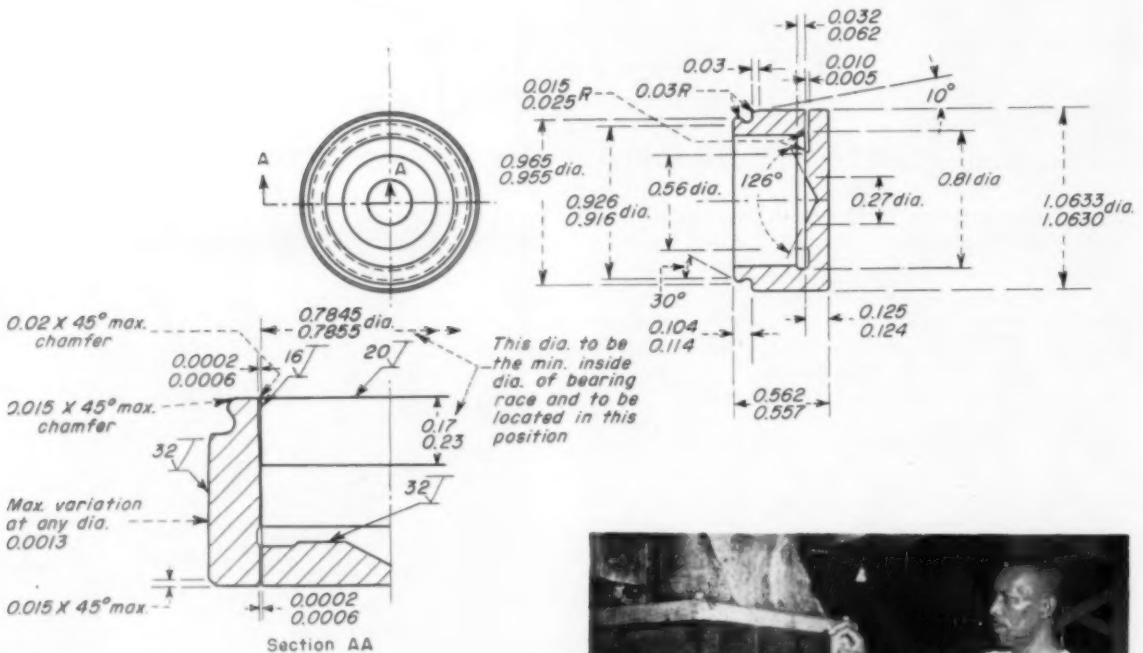
**Unique tooling . . .** the first station in the J & L pinion machining line, like others, is cam actuated to perform multiple operations in proper sequence. Here the work is held securely on the outboard bearing in the left-hand carriage while the stem is supported in the right-hand carriage for milling the ends with multiple-insert carbide cutters. Center drills in Erickson collet chucks enter the ends afterwards. A transfer arm then removes the pinion and loads a work fixture that reciprocates between stations 1 and 2 and swivels 180° in the horizontal plan to receive it. The work fixture returns to Station No. 2, where similar arms pick the pinion up to load and position it for the next operation.



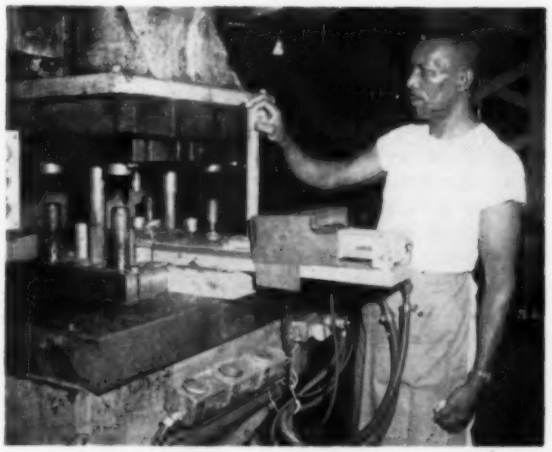
**Floating storage . . .** at the end of the J & L line, after identification numbers are applied, receives machine pinions and delivers them to an automatic Cincinnati grinder. Pinions are elevated to the top track of this conveyor, zig-zag down upon demand. In this way, a constant delivery of parts is assured at the grinder when tools on the automatic machining line are being changed

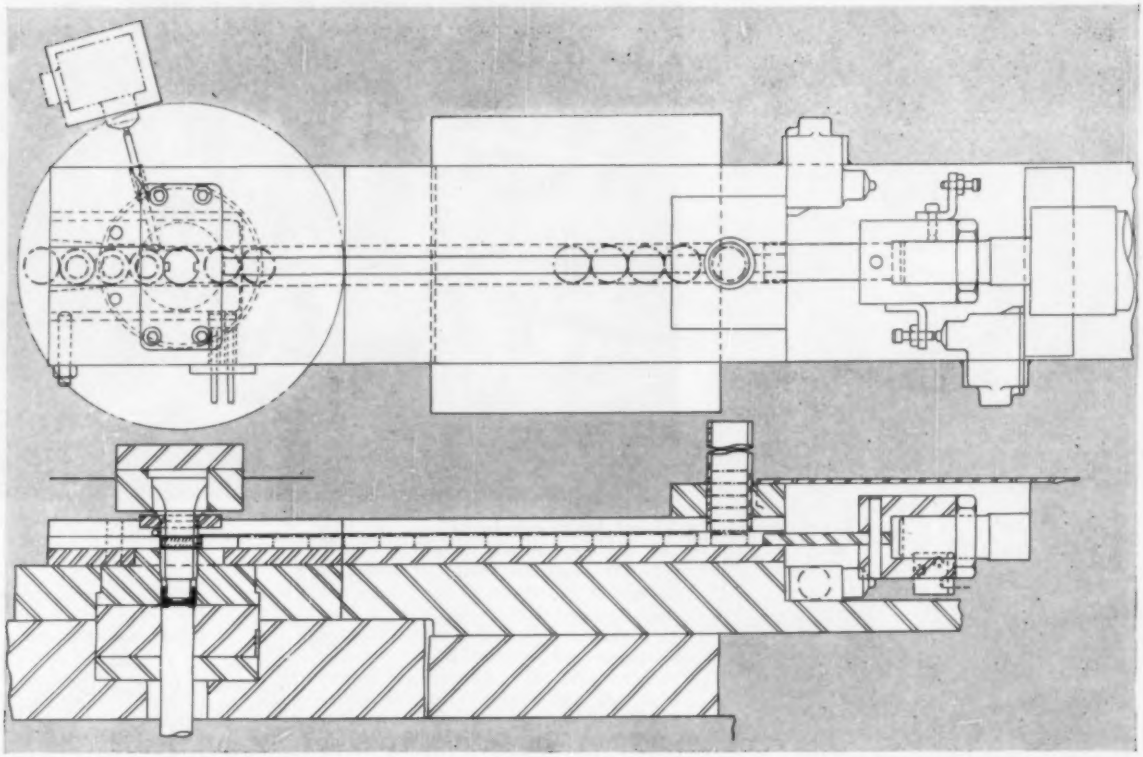


**Automatic loading . . .** of this Cincinnati grinder is accomplished by an indexing work fixture that delivers pinions to the work area in a reciprocating slide. Work is located on centers and driven on the outboard bearing for grinding two bearing diameters and a bearing face with an angular head wheel. Bearing diameters may have no more than 0.001-in. runout (TIR), checked from the centers




**Cold extrusion . . .** of this bearing race permitted addition of 0.0002 to 0.0006-in. crown on the inner wall—a product design feature not practical with previous manufacturing methods. Material is 1-in.-dia SAE 1010 steel 0.385 to 0.400-in. thick, blanked from 12-in.-wide stock 8 to 10-ft. long eleven at a time in a 400-ton press. Blanked slugs are alkali cleaned, rinsed, pickled, cold and hot rinsed, passed through a Bonderite tank, rinsed again, neutralized and finally coated with a lubricant before cold forming. They are then manually loaded into a "money-changer" magazine feed that delivers them to a die in this 200-ton press for extrusion at a rate of 25 per minute. A number of automated machining and grinding operations follow extrusion to reach the dimensions and tolerances shown here





**Tools for cold extruding . . .** bearing races include an air-cylinder-actuated slide that loads the die. A limit switch, tripped by an ejected part through a spring-loaded pin, actuates the feed-slide air cylinder. In this "reverse-extrusion" setup, the slug is pushed into the die by the action of the upper punch, which continues its advance while the material extrudes back around it. Upon withdrawal of the upper punch, the lower ejector is actuated to raise the cup for ejection

where flanges or shouldered sections are required.

In general, the advantages gained with cold forming include consistently close tolerances, good surface finishes, and, of course, considerable savings in material. Better physical properties are obtained with superior grain flow, greater strength than unheat-treated hot forgings is common, and in some cases heat-treatment is eliminated. Often machining operations are eliminated in non-critical areas and, where machining is required, it may be reduced. Tool costs are cut because less stock is removed.

**OTHER NEW TOOLS . . .**

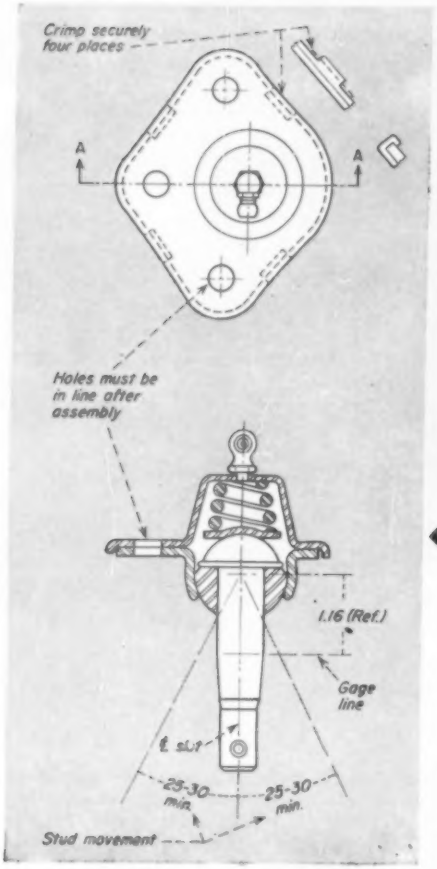
. . . include a Yoder tube mill at Sterling with a Ford-designed storage device that permits continuous operation even while empty cradles of stock are being replaced. With this unusual coil-storage system installed over the top of the mill, the scrap produced by conventional starting and stopping (usually 4 to 5 ft of tubing) is eliminated.

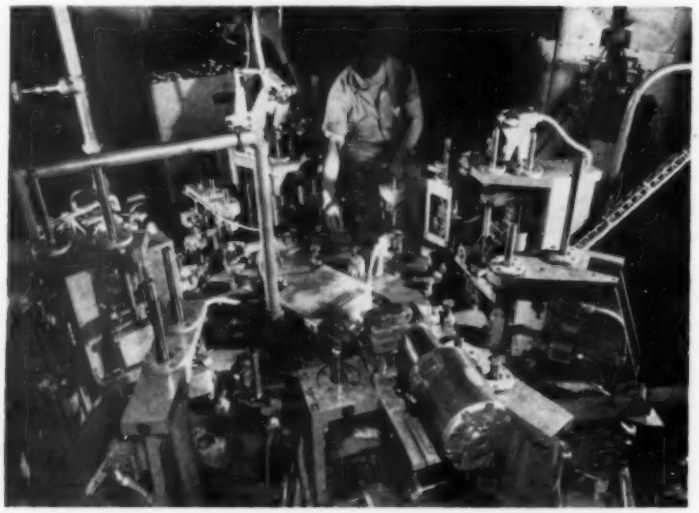
Hot-forging ring gears in a Verson "Transfermatic" at the Canton, Ohio, Forge Plant is another new development that pays dividends. Originally, these gears were produced on four forging presses and four trim presses at a production rate of approximately 240 pieces per hour per press. The transfer-press setup produces about 1000 gears per hour, eliminates the separate trim operation, and holds closer tolerances. A big factor is the material saved. In addition, tool life in machining the new forgings is increased because less stock has to be removed.

Hot billets are delivered to the press from two continuous furnaces, where an 8-station die (seven working and one for unloading) is capable of maintaining an insert temperature of 400 to 500 F at all times. A special, self-contained refrigerating system is included to cool the dies and feeding mechanism. Welded converters for '58 models instead of bolted assemblies have led to new welding techniques at the Livonia Automatic Transmission Div plant. Here, automatic Progressive arc welders are employed to join covers to converter housings three at a time using $CO_2$ as a shield.

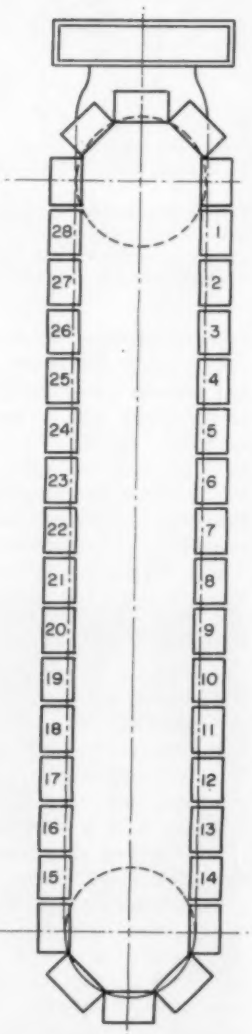
A new automated Mercury grinder in the same plant is made up of two sections, each with two roughing wheels and one for finish-grinding. A turnover fixture between the sections permits grinding both ends of transmission converter housings without attention from the operator except for loading and unloading. Converter housings leave this setup and are processed through a new Buhr transfer machine that permits intermixed loading.

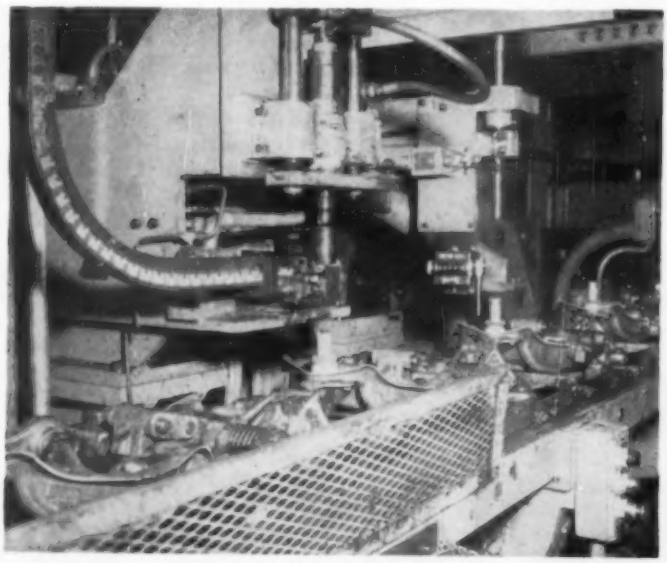
These and other tools for Edsel parts (as well as tools for other '58 models) have been selected for detailed description in the following pages.



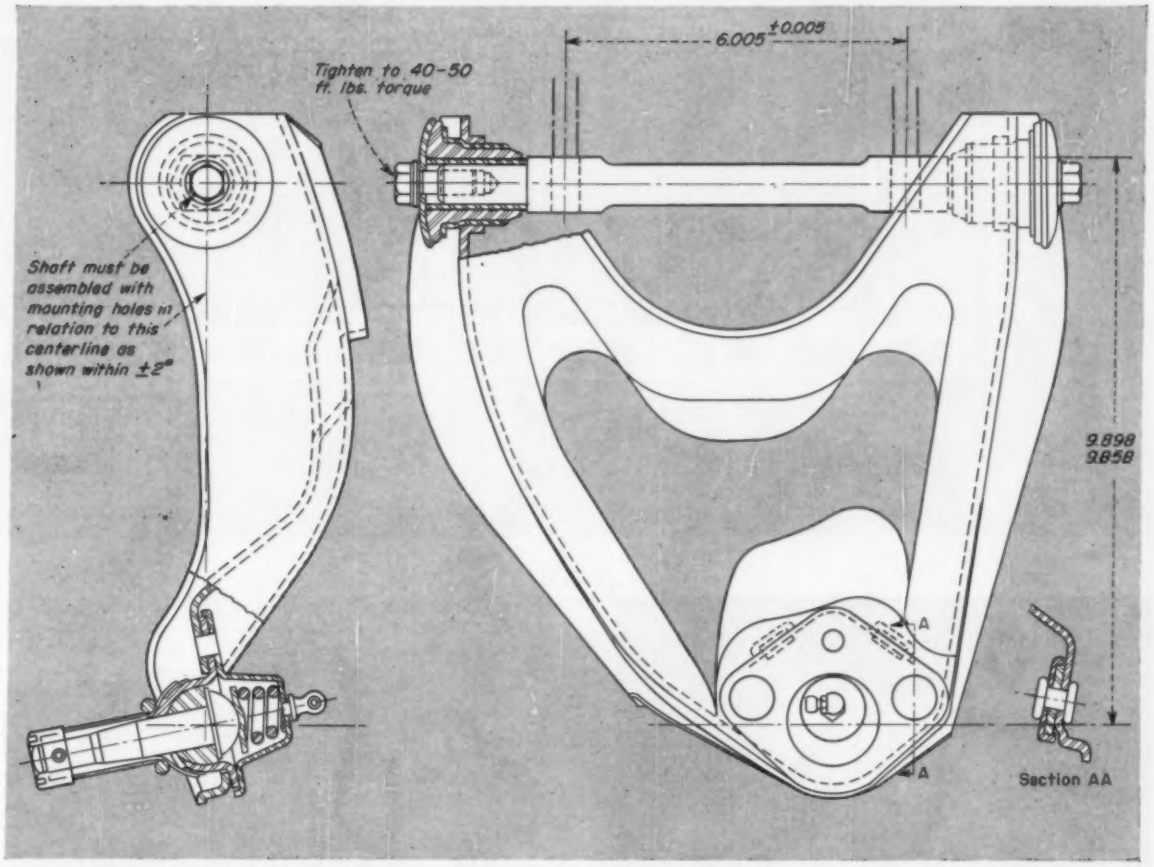



**About 1000 per hour . . .** is the rate for automatically assembling upper ball-joint assemblies. Socket is loaded at the first of 16 stations in this Gilman machine, then checked at the second. Throughout the cycle, automatically loaded components are checked at the following station to insure they are there and properly located. The bearing is assembled after the socket, following which the stud is added and then the seat. The spring and cover are next, and after the cover is crimped the whole assembly is checked. Last is the grease fitting, followed by checking and rejection if the assembly does not meet specifications. Finally, the whole unit is automatically unloaded

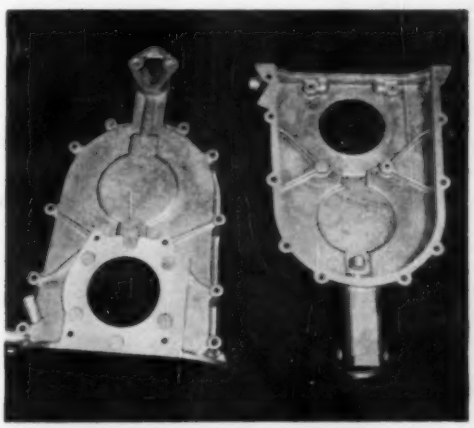


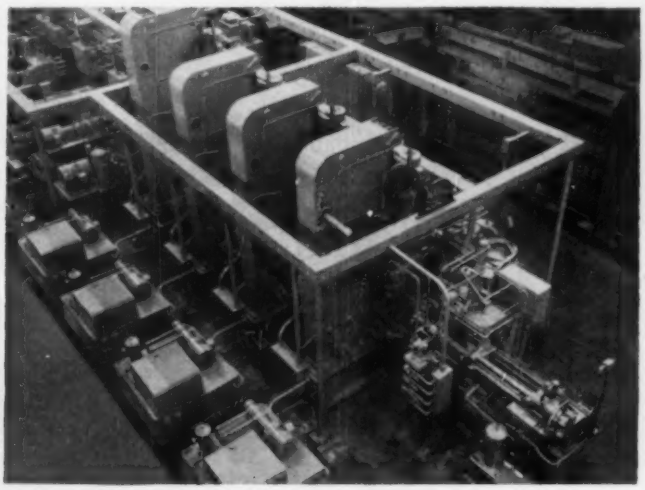



**One of 28 stations . . .** in this Gilman in-line assembly machine (No. 23) installs a nut after a protective paper tube has been assembled on the ball joint stud in an upper arm. Parts are checked for presence and position in this machine, too, as they are carried from one assembly station to the next along an oval track. When a defect is indicated at any one of nine different automatic inspection stations, a memory unit designates the part a reject and it moves through the remaining stations with no further work being performed. Production rate is about 500 assemblies per hour



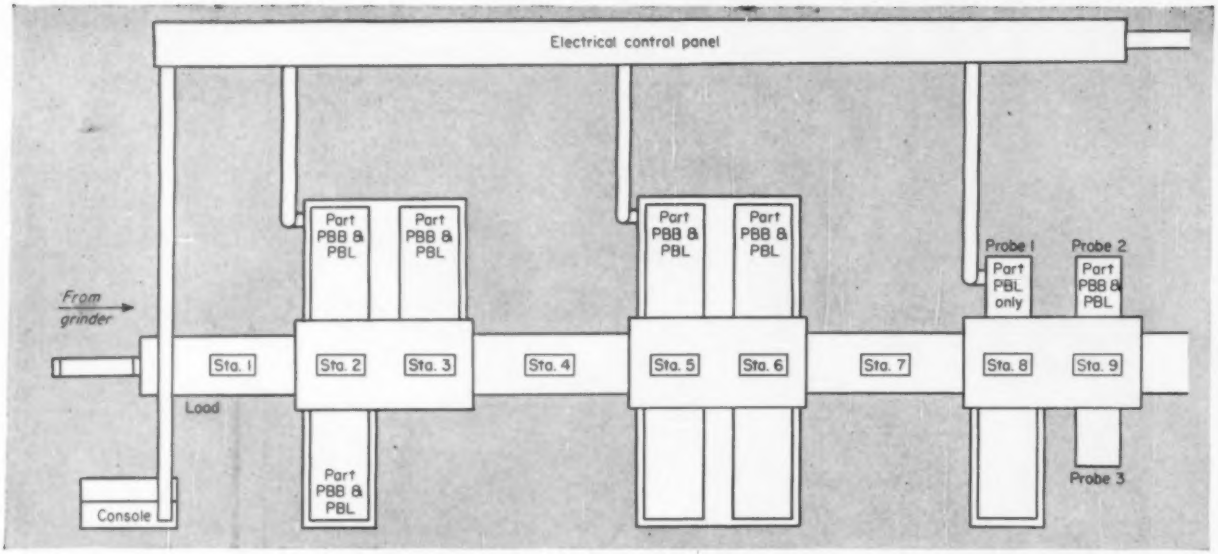

**Basic parts . . .** of this upper arm assembly are locked in fixtures on the inline machine for assembly with components delivered from automatic feeding devices. Operations include riveting, assembly of bushings, retainers, lockwashers and screws. Torque is applied to the screws and checked, the cover is assembled as are the shield and seal, and the ball-joint is filled with grease. Principal manual operations are loading the ball-joint assembly and unloading the finished assembly

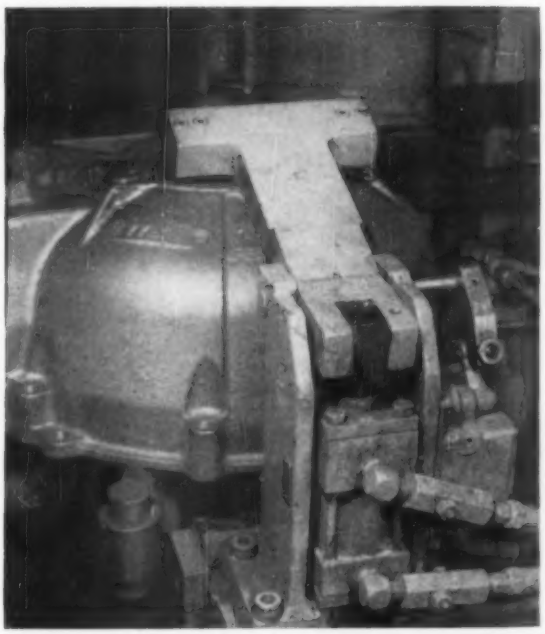




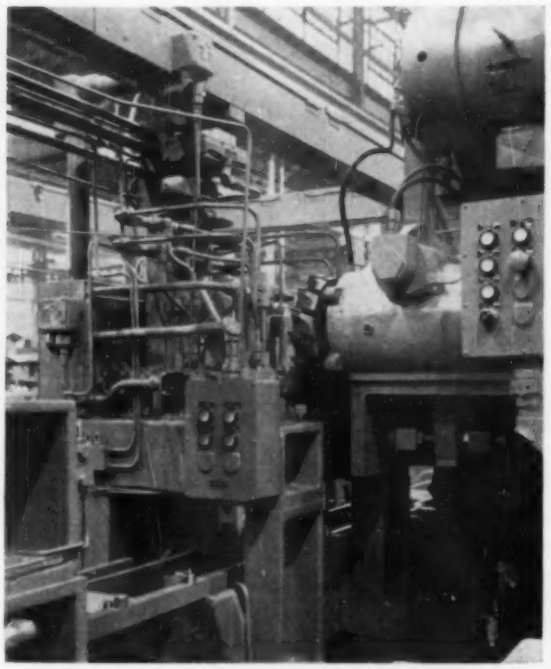
**"Scrambled" loading . . .** of two different engine front covers for different '58 models is possible in this 32-station Natco machine at one of Ford's Engine plants. Cast-aluminum front covers for both models are similar, except that one has a large bore and four mounting holes for a power-steering unit. Limit switches at four stations sense the location of the large hole and direct the machine to process the front covers for power steering or direct these stations to remain idle if standard steering units are going through. A telephone at the pulpit with jacks along the length of the machine permits a tool setter to talk to the operator from any point

## New tools for FORD'S new Edsel . . .

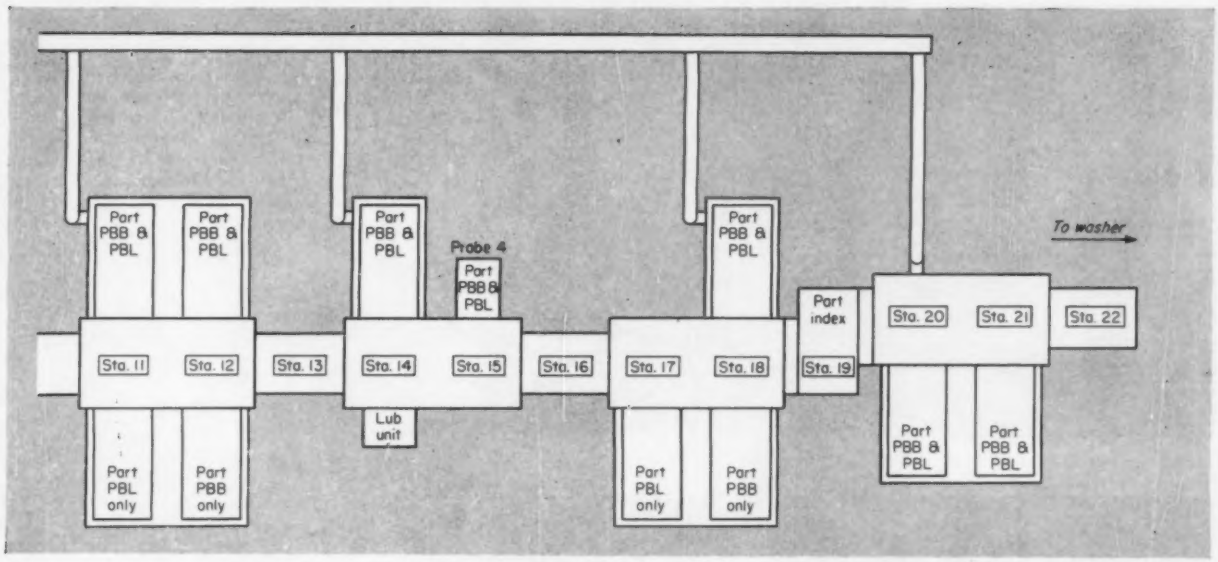


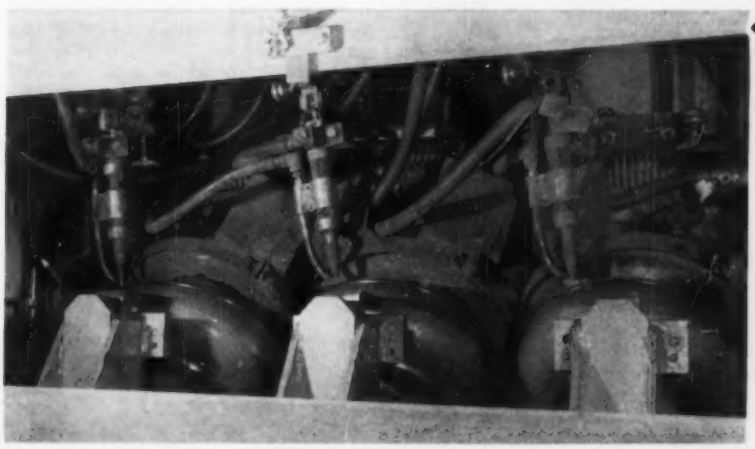



**More "scrambled" loading . . .** is accomplished with this 22-station Buhr transfer machine for processing automatic-transmission converter housings at the Livonia, Mich. transmission plant. Two types of housings can be intermixed in this setup because one type (designated PBL) has a lug that actuates limit switches and relays to energize the required tools. With no switch-tripping lug, the other part (PBB) proceeds through without actuating the heads used for PBL. After parts are loaded at the first station (as received from a special Mercury grinder), the machine bores, chamfers, drills, reams, mills, and taps automatically, ultimately delivering the housings to a conveyor for transfer to a Detrex washer. Turn-over of the part 90° in the vertical plane to position it face-down occurs at the 19th station after eleven holes have been tapped

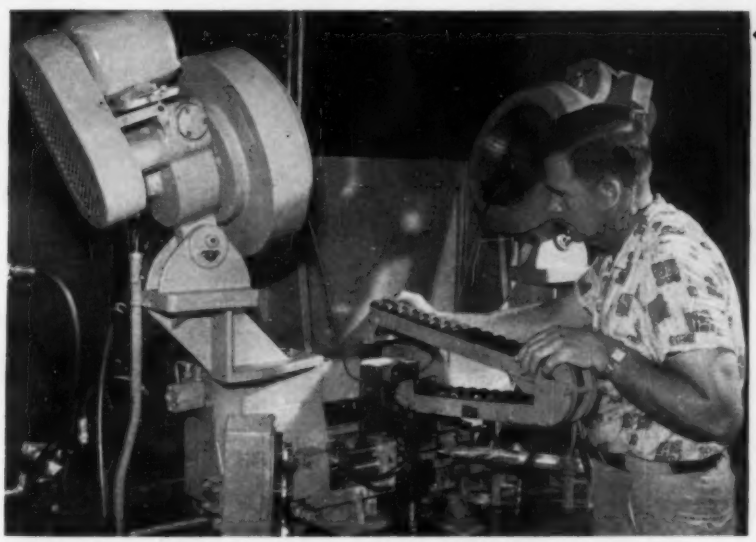


**High-speed operation . . .** of the Natco walking-beam transfer machine (one part every 15-sec) is possible in machining aluminum. Vertical descent of this head at Station No. 2 provides for milling the bottom of front covers. Operations in addition to this include drilling, probing, and tapping the covers for power steering or drilling, countersinking, and reaming covers for standard steering units. After turning all parts 90°, eight outer mounting holes are produced. On covers for power-steering units four holes are drilled, probed and tapped and the large hole is rough and finish bored. Face and neck of all parts are milled and the neck is combination core drilled and reamed for a welch plug. Other holes are drilled, reamed, and tapped in the neck before the plug is automatically assembled and the parts unloaded



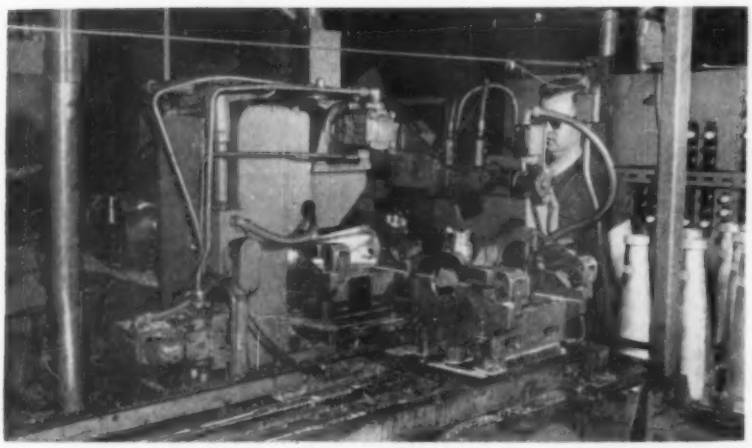



**Automatic welding . . .** of new converter assemblies replaces bolted design, provides a seam capable of withstanding 90-psi pressure. Three assemblies are handled at once in this automatic Progressive gas-shielded metal arc welder, where $CO_2$ is used as a shield. Wire feed is 120 ipm, as is the welding speed. Production rate runs about 450 pieces per hour with a 21-sec welding cycle. Parts are automatically loaded into a shuttle, indexed into position, and clamped, whereupon the welding cycle starts automatically. A special timer cuts the cycle after 370° rotation from any starting point, thus providing a 10° overlap of the seam. After welding, the parts are automatically unclamped, indexed into the shuttle, and moved into the unloading position for automatic ejection. A conveyor system carries them to a test area

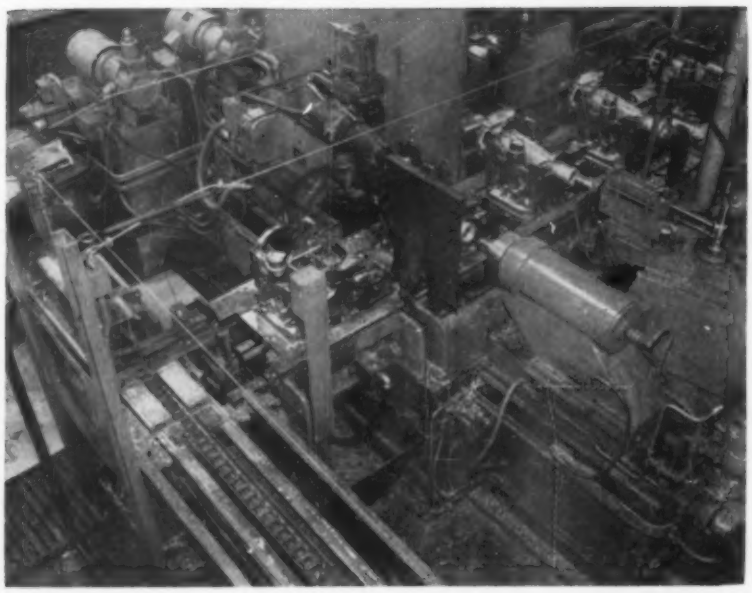


**Automations is combined . . .** with manual operations in this setup, where bushings and needle bearings are installed in transmission pinions. An operator drops a bushing into each pinion before loading the feed track. Pinions zigzag down the track to a reciprocating work fixture, where they are automatically injected with grease before transfer to the bearing assembly head. Two rotating drum feeders deliver needles to the assembly head, where they are positioned around a mandrel that inserts them into the pinion (around the outside of the bushing). The work fixture then retracts to the load position, where the assembled part is ejected and a new one is positioned

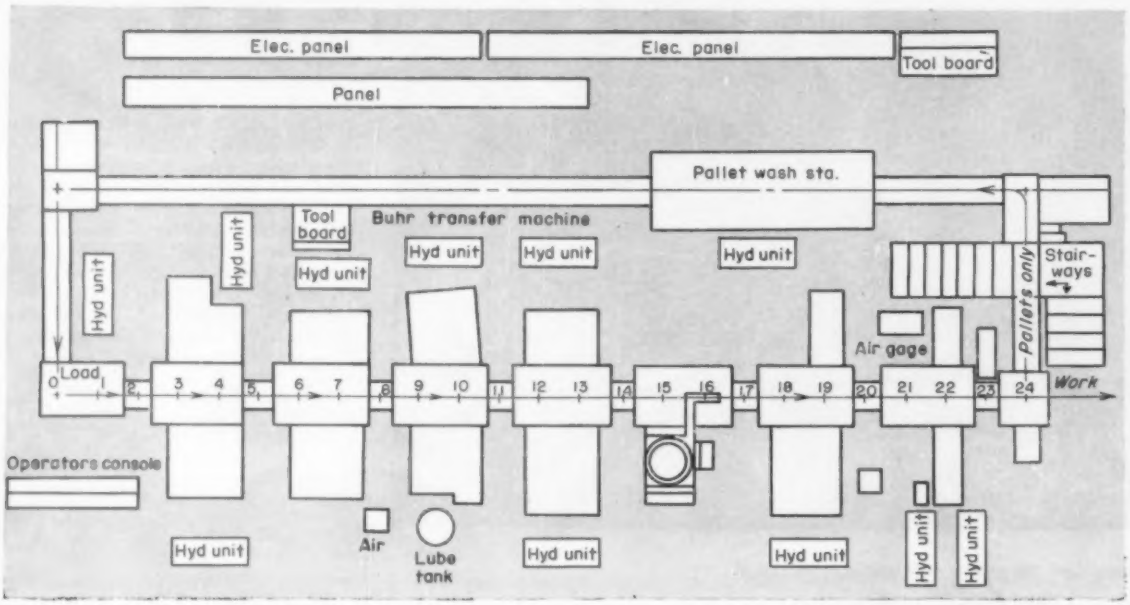
## New tools for FORD'S new Edsel . . .



**Aluminum transmission extensions . . .** for Edsel and other '58 cars are loaded into pallets for transfer through this 24-station Buhr machine (cover). Pallets return from an automatic washer to the load station, where extensions are received on an inclined roller conveyor from two Sundstrand machines. Fixture location diameters are turned in the automatic Sundstrand machines



**Tools are stationary . . .** and the work rotates at the last station of the Buhr machine. In this unusual setup, the pallet automatically releases the work in the preceding station so that it can be chucked in the next head at one end and engaged by a live center in the opposite end. During rotation of the part, a facing tool finishes the mounting end of the transmission extension. Preceding operations include drilling, reaming, tapping, and boring. All air gages operate in conjunction with heads, so that parts are inspected as they are machined. Undersize or oversize dimensions are detected immediately and the machine stopped until tools are reset.

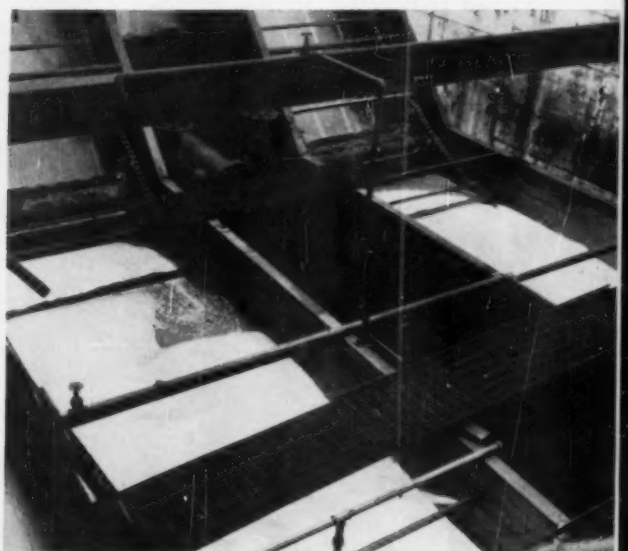


**Blanks for electrocardiograph magnets** are ground flat on 42-in. Besley table. Stock removal is 0.002 to 0.025 in.; production rate varies with blank sizes. At another station, a Mattison double-spindle disk machine grinds small segmented-bar magnet blanks at 400-3000/hr, using semi-automatic feed mechanism

# All grinders here use a standard coolant

**Alnico magnet castings of all sizes and shapes are finished at Crucible Steel's Spaulding Wks at Harrison, N J, on many different grinding machines. But only one coolant is applied—Codol, made by D A Stuart Oil Co—to allow using a centralized coolant system and to gain dividends in work quality**

**Alnico horseshoe** that will become a separator magnet is clamped on a Gardner grinder so its pole-piece ends can be shaped to convex angle, checked by templet. Production rate is 25-30/hr; stock removal is 0.020 to 0.035 in. Alnico is an alloy of aluminum, nickel, and cobalt, and will be magnetized later



**Outdoor reservoir and separators** clean and store more than 15,000 gal of 30-1 Codol grinding fluid used for all Alnico-grinding operations. Solution is richer than normal to promote wheel life and machine life, to reduce danger of rust, and to improve work finish. Makeup fluid is added from 55-gal drum over several hours to prevent excessive foaming

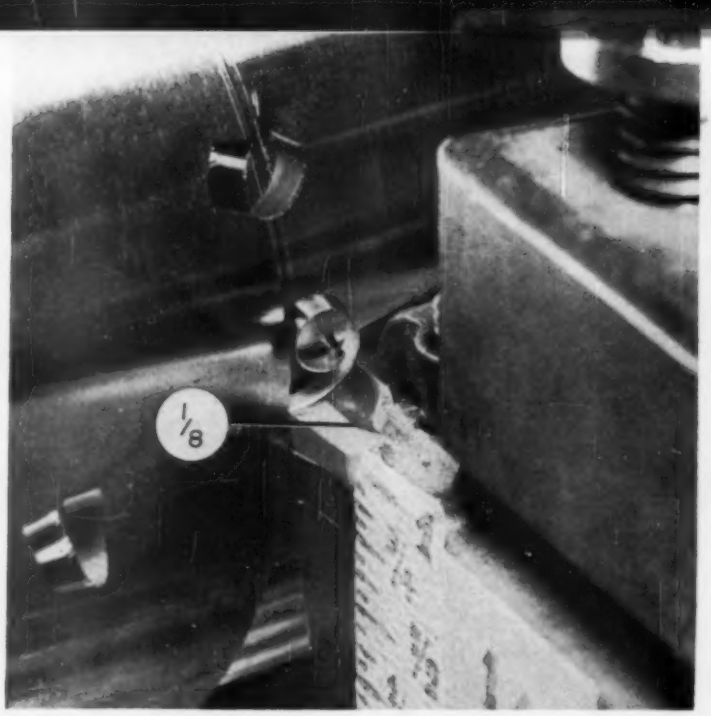
# CERAMICS Cut HSS ...and show their weaknesses

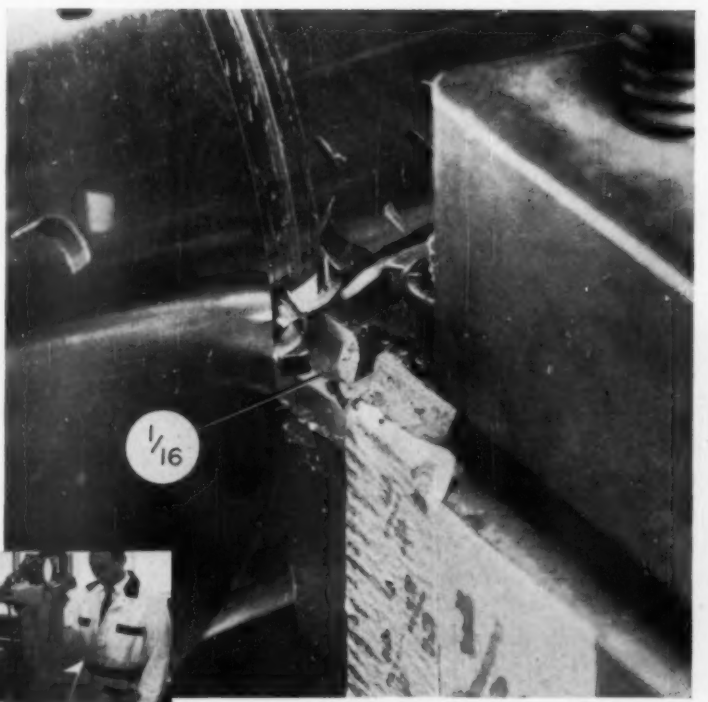
JOHN F McAULIFFE
supervisor, cutting-tool research
PRATT & WHITNEY CO, W HARTFORD, CONN

With any new tool material it takes time before safe starting conditions are established. After two and a half years of laboratory research on ceramic cutting tools, these values have been adopted for average cutting setups:

- 5° negative side rake
- 5° negative back rake
- 15° side cutting-edge angle
- 10° end cutting-edge angle
- 5-7° relief for end and side cutting edges
- 1/32—3/64-in. nose radius

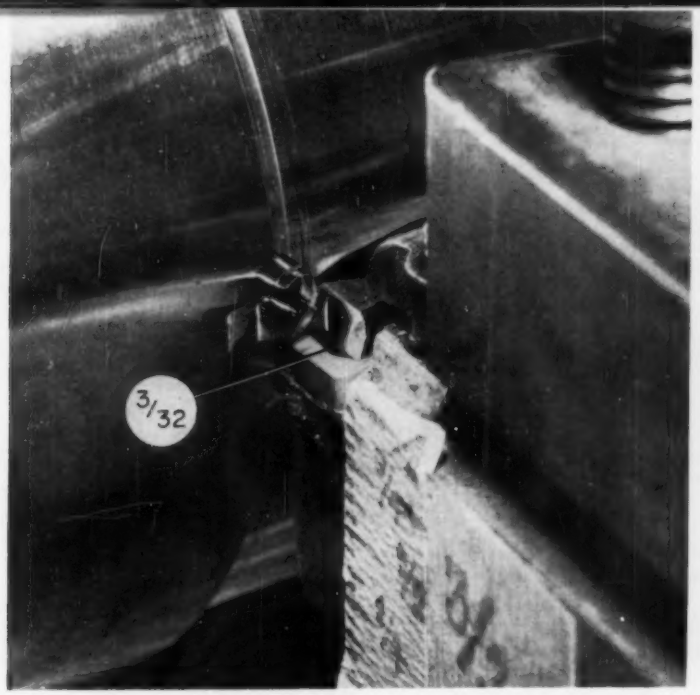
Triangular bits have proved more subject to chipping, but neither triangular nor square bits show any more cutting-edge wear than ⅝-in. round slugs. However, to cut with thin inserts it is essential that clamping pressure be distributed evenly over the tip.

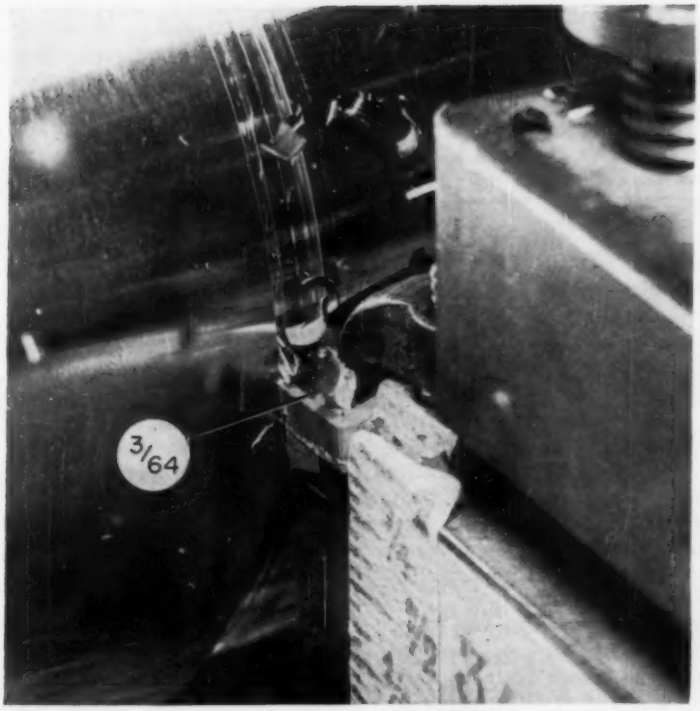



**Chips break up best** when they contact chipbreaker about half way up face. Distances between cutting edge and edge of chipbreaker in the four tests

**Tests of ceramic toolbits were made** in P & W cutting-tool research laboratory on P & W lathe. Sanborn strain-gage amplifier and recorder is at left; GE recording wattmeter is at right




illustrated above ranged from ⅛ to 3/64 in. as indicated on the photos. Stock here was M-1 HSS, speed 440 sfpm, cut depth 0.100 in., feed 0.010 ipr. Toolbit was Stupalox

One popular misconception about ceramic tools has been disproved. Far from being cooler in operation than carbide, ceramics show higher temperatures when subjected to high-speed infrared photography that picks up heat distribution over the tool face. But ceramics do not absorb or conduct heat readily, and infrared films show no heat image only 1/10 sec after the tool has left the work. Heat is radiated so quickly the tools seem cool.

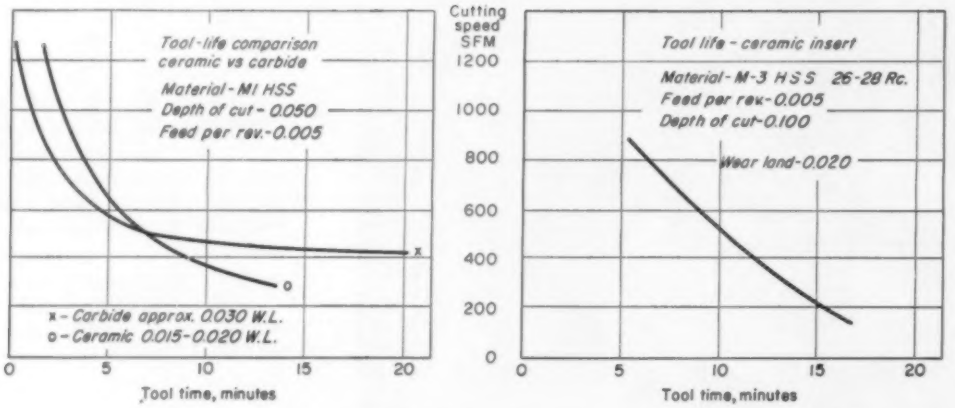
Another point can be made about chipbreakers, which should not be ground into the ceramic material because they cause stress concentrations. In addition, ground-in chipbreakers do not allow adjusting the chipbreaker for different cutting conditions. Thus, a mechanically held breaker can properly be adjusted so the chip contacts its face about half way up, and so the chip curl does not abrade the side cutting edge.

Most tests made at Pratt & Whitney were conducted with HSS work materials such as M-1, T-1, M-3, and T-15. One of the first easily seen results was cutting-edge chipping, which proved that negative-rake tips, even though they require more machine power, should be preferred.

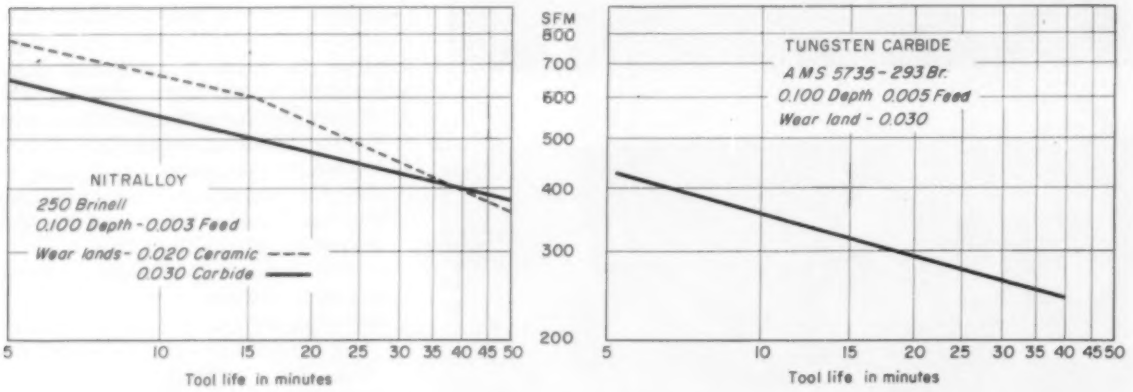
The first chart (p132) shows a comparison between ceramic and a general-purpose carbide grade, both working on M-1. Below 250 sfpm the ceramic could not compete with the carbide. Wear land on the carbide tool was 0.030 in., but was 0.020 in. on the ceramic because the tool chipped at values beyond this point. Tests on T-1 produced similar results. Normal cutting speed for this material (with carbide tool) is 180-260 sfpm.

The second chart shows results with a ⅜-in. circular tip ⅛ in. deep. Machinability of M-1 is 40% based on B-1112, and machinability of M-3 is 36%. Results on T-15 as the work ma-

***Laboratory tests of ceramic tools working on high-temperature and high-speed steels show that negative rakes and low feeds are essential with presently available ceramic materials. These tools showed early edge breakdown against really tough work materials. A series of four unusual closeup photos of chip action shows how important the chipbreaker can be***




**Charted results show** (above) ceramic vs carbide tool life, and ceramic tool life vs surface speed on M-3, (and below) ceramic and carbide tool life vs surface speed on Nitralloy, and tungsten-carbide tool life vs surface speed on 5735 steel




terial were about the same, although slightly more power was required. But HSS materials wore deeply into the ceramic at the depth-of-cut line, which made heavy tool honing necessary.

Limited tests on titanium 130B were made at speeds from 200 to 400 sfpm with ceramic tools having both positive and negative rakes. High-speed movies taken of the ceramic tools and carbide tools showed no reason why the ceramic should chip and crack. But it was apparent that poor cutting action was not due to intermittent chip action because of preferred orientation of the crystal structure. Cutting forces, as measured by a dynamometer, were not high, but the high shear angle of titanium concentrates this force in a small area, and it is believed that this high pressure was more than the edge of the tool could stand. Further investigations are now being made of this action.

The third chart shows results in cutting Nitralloy 135 $R_c$24, a high-strength nitriding steel for aircraft parts. When the nose radius was reduced from 3/64 to 1/32 in., best tool life and freedom from chatter were found. Angles were as indicated above for general conditions. Feed was only 0.003 ipr, which produced finishes of 32 mu in, with both ceramic and carbide tools. The ceramic seemed to produce a cleaner cut, but it was not measurably smoother.

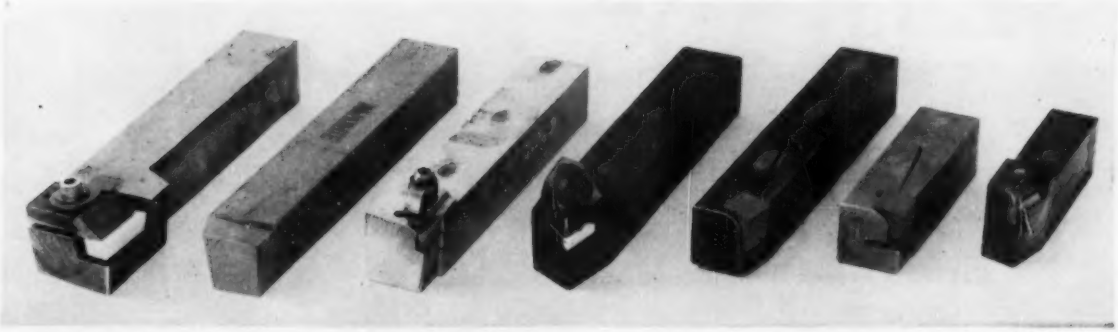
The final chart shows results in cutting an aircraft high-temperature alloy, known both as AMS 5735 and A-286. Typical analysis, furnished by Firth Sterling, is:

| | *per cent* | | *per cent* |
|---|---|---|---|
| Carbon | 0.045 | Titanium | 1.95 |
| Manganese | 1.35 | Vanadium | 0.32 |
| Silicon | 0.95 | Aluminum | 0.20 |
| Chromium | 15.52 | Sulphur | 0.018 |
| Nickel | 26.06 | Phosphorus | 0.021 |
| Molybdenum | 1.25 | Iron—balance | |

With tool angles as above for general conditions, the tool nose shattered before any cut could be made. Changes in nose radius and heavier stoning proved fruitless. Turning the toolpost to obtain an effective side cutting-edge angle of 45° made a noticeable improvement, but tool life was too short. Experiments with various speeds and feeds showed the greatest stock-removal rate at 180-200 sfpm with 0.010-0.020-ipr feed and depth of cut at 0.070-0.100 in.

Although positive rake worked well, no ceramic tool with a positive rake could be made to cut longer than two minutes. High speeds abraded the cutting edge and top face badly, and pieces of metal were imbedded in or welded to the ceramic.

Dynamometer forces on this material, taken at 350 sfpm, 0.100-in. depth of cut, and at 0.005 ipr with carbide tools, were 207 lb cutting force and 193.2 force with a negative-rake tool; 184.5 lb cutting force and 126.5 lb feed force with a positive-rake tool.



**Test tools were mixed,** from several manufacturers, and showed no significant differences. Short-shank tools were for dynamometer tests

Calculations show these forces result in a maximum pressure of 214,000 psi at the cutting edge for the negative-rake tool, and 173,000 psi for the positive-rake tool. These calculations assume an infinitely sharp tool and a chip—tool contact distance from the cutting edge equal to four times the feed. This was measured on several tools and found to be consistent.

A ceramic tool operated at a negative rake, but with other conditions the same as with the carbide tools (above), produced a cutting force of 204 lb and a feed force of 194 lb—about the same as the carbide. However, chip—tool contact distance averaged only 0.0137 in. —less than three times the feed rate. This distance was irregular, and forces and power consumed increased rapidly as the ceramic cutting edge broke down. On the contrary, the carbide exhibited a slow rise in forces and wear.

Thus, the ceramic is under greater pressure than the carbide because of less contact area. The tool breaks down rapidly, indicating that the pressures are greater than the strength of the material will allow. The larger side cutting-edge angle helps by distributing the force over a greater area, which increases tool life.

The only conclusion is that unless the strength of ceramic cutting materials is increased, it is doubtful if changes in tool geometry will permit a practical life in many of these high-temperature maerials. It has been reported by several tool manufacturers that they are making progress in this direction.

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# Weldments improve bar-feed stands

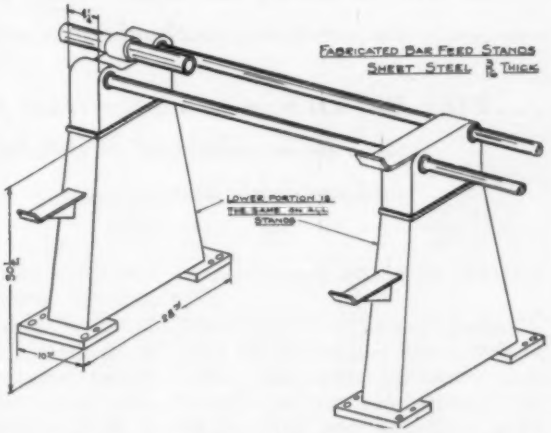
A J McCLELLAND, development engineer

WARNER & SWASEY CO, CLEVELAND

Two types of hydraulic bar feeds were required for new model W & S turret lathes, featuring higher speeds, greater horsepower and, as a consequence, greater rigidity. One was an automatic type similar to that used on the ram turret lathe in conjunction with a collet chuck. The other was a semi-automatic type for use with a bar chuck handling larger sizes of bar.

Stands formerly built for the automatic feed were a combination of welded pipe and castings; those fitted to the 1A screw-type bar feed were of threaded pipe and castings. Both suffered on the score of rigidity and appearance, measured by today's standards. After studying a number of proposed redesigns, it was decided to specify fully fabricated stands of 3/16-in. sheet steel and other stock sizes of steel plate.

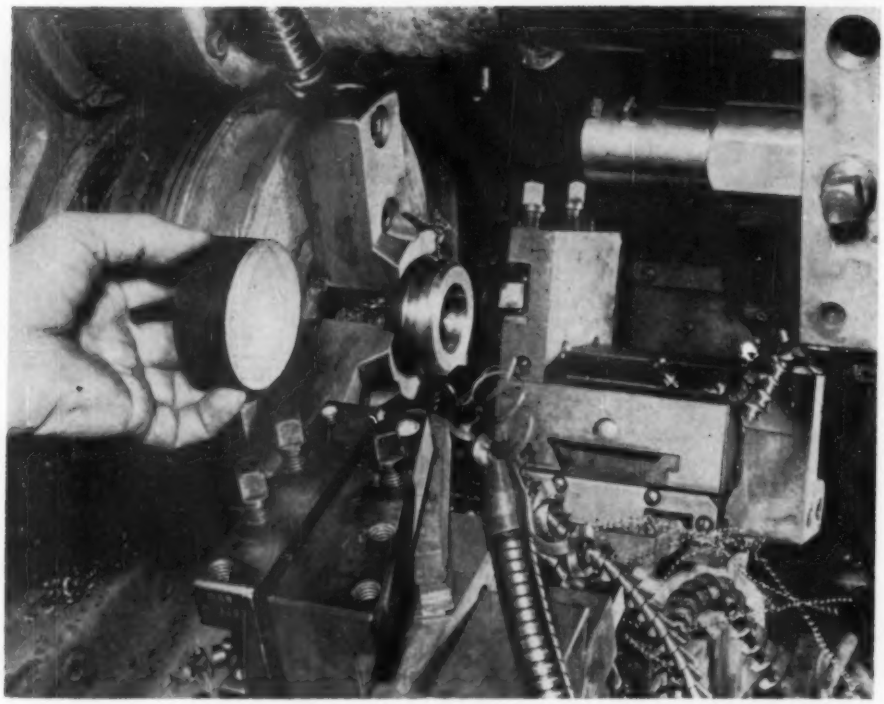
The accompanying sketch shows the new stands. An interesting feature is that, although three different stands are needed, the right-hand unit being borrowed for both types of feed, it is possible to make the lower




portion of the stands, from the base up to a height of 30½ in., the same for all. This greatly reduces overall cost, as material can be cut in larger quantities and fabricated in lots four times larger.

The same principle applied to the bar-feed leg for larger turret lathes. Originally, it involved three cast legs but, by a small change in the bar-feed beds, a single fabricated leg was substituted, with appreciable cost savings.

*Based on a prize-winning paper submitted in the recent Machine Design Competition sponsored by the James F Lincoln Arc Welding Foundation.*



# Slugging...

*... AN IDEA: cut off bar stock before lathe operations, then cut contours in chucking machine*

*... FIVE PROOFS: case studies from five plants that tried it and found it to be economical of machine time, direct labor, and available space*

CHARLES EMERSON, associate editor

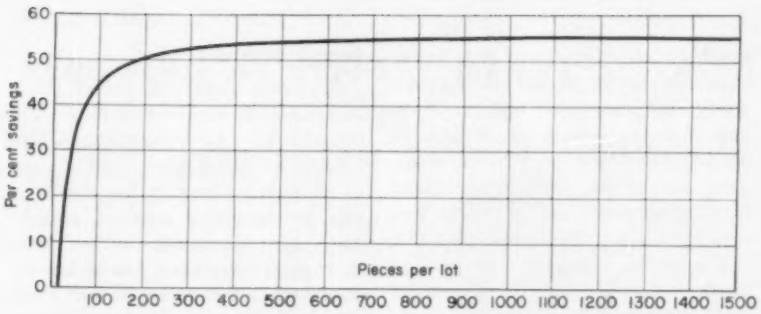
Slugging is based on two premises: Modern cutoff equipment can part slugs from bars faster than a turning machine can cut off finished parts, and slugs are often easier and cheaper to handle in the shop than whole bars. In addition, smaller faster machines with shorter cycles can turn slugged workpieces that would require large, heavy turret lathes if the stock were in bar form, and center holes can be drilled more profitably on drillpresses when the stock is slugged.

It is not a new idea, and has long been favored in Europe, especially England, where turret lathes of large bar capacity may be in short supply. But it has received increased emphasis in recent years because new designs of single-spindle automatic chucking machines allow savings of from 35 to 75% when the proper kinds of workpieces are slugged.

## GEAR JOBS

Some work responds better to slugging practice than others; for example, gear blanks that require center holes. Some 57 gear-blank jobs were recently tested in a slugging program at Warner & Swasey Co. New slugging data was compared with old, established cost records complied over many years. Slugs were cut on a Motch & Merryweather circular saw with automatic feed, and were drilled to produce center holes on a 3-in. Baker drillpress.

Average saving, based on 100-pc lots, was 42.8%, with saving per job ranging from 18.7 to 64.3%. Normally, single-spindle chuckers show cost advantages over turret lathes when the work is complicated, but in the case of the gear blanks the work was simple, and savings were a direct result of the slugging program.




## Slugging Results at Warner & Swasey

**Savings curves for slugged work** all follow same general shape; this curve averages figures for parts with drilled center hole and hub. Breakeven point is around 10 units, but best minimum lot size is probably around 20-30 pc

| Part Name | Type T L | Type A C | Size Bar | Mat'l | T L Cycle Hr | T L Setup Hr | Cutoff Cycle Hr | Cutoff Setup Hr | Drill Cycle Hr | Drill Setup Hrs | A C Cycle Hr | A C Setup Hr | A | B | C | D | E | F | G | Break-point (Pc) | Savings |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Intermediate Shaft Gear | 6"3A | 1AC | 3-1/4" | A4150 | .167 | 1.90 | .037 | .030 | .024 | .100 | .084 | 3.30 | 3.015 | 1.250 | 1.490 | 5/8 | 2-1/2 | 5/8 | | 9.4 | 47.9% |
| Gear | 6"3A | 1AC | 3-1/2" | A4150 | .179 | 2.10 | .037 | .030 | Drilled | On 1AC | .094 | 3.00 | 3.415 | 1.258 | 2.112 | 5/8 | 2-7/8 | 5/8 | | 4.3 | 51.2% |
| Gear | 6"3A | 1AC | 3-1/2" | A4150 | .158 | 2.00 | .037 | .030 | Drilled | On 1AC | .080 | 3.30 | 3.348 | .925 | .992 | 3/8 | 1-3/4 | 9/16 | | 8.8 | 46.9% |
| [illegible] | | | | | | | | | | | | | | | | | | | | | |
| Gear | 6"3A | 2AC | 4" | C1045 | .196 | 2.00 | .040 | .030 | .023 | .100 | .084 | 3.50 | 3.790 | 1.844 | 1.251 | 11/16 | 2-1/4 | 1-1/8 | | 10.7 | 48.9% |
| Gear | 6"3A | 2AC | 4" | A4150 | .270 | 1.80 | .043 | .030 | .058 | .100 | .109 | 3.30 | 3.715 | 3.513 | 2.112 | 3/4 | 3-1/8 | 2-3/4 | | 7.9 | 51.9% |
| Adjusting Nuts | 6"3A | 2AC | 4" | C1045 | .179 | 1.10 | .045 | .030 | .063 | .100 | .035 | 1.30 | 3.875 | 3.136 | 2.545 | 2 | 3-9/32 | 1-1/8 | | 1.4 | 57.7% |
| Closer | 6"3A | 2AC | 4-1/4" | C1118 | .100 | 1.80 | .043 | .030 | .024 | .100 | .069 | 2.70 | 4.000 | .750 | 2.438 | 3/8 | 2-3/4 | 3/8 | | 25.0 | 18.7% |
| Clutch Shaft Gear | 6"3A | 2AC | 4-1/4" | A4150 | .122 | 1.80 | .043 | .030 | .029 | .100 | .088 | 3.10 | 3.998 | 1.512 | 1.740 | 1-1/8 | 2-1/2 | 3/8 | | 29.1 | 19.8% |
| Backshaft Gear | 6"3A | 2AC | 4-3/4" | A4150 | .258 | 2.00 | .048 | .030 | .027 | .100 | .143 | 4.00 | 4.431 | 2.063 | 1.365 | 1 | 2-3/8 | 1-1/16 | | 12.4 | 45.4% |
| Intermediate Shaft Gear | 6"3A | 2AC | 4-3/4" | A4150 | .199 | 2.00 | .047 | .030 | .024 | .100 | .074 | 3.20 | 4.615 | 1.250 | 1.490 | 7/8 | 2-1/2 | 5/8 | | 8.0 | 51.8% |
| Pinion Shaft Gear | 6"3A | 2AC | 4-3/4" | A4340 | .272 | 1.50 | .050 | .030 | .069 | .100 | .166 | 3.10 | 4.515 | 3.211 | 2.612 | 2-11/16 | 3-5/8 | 1/2 | | 11.5 | 39.2% |
| [illegible] | | | | | | | | | | | | | | | | | | | | | |
| Gear | [illegible] | | | | | | | | | | | | | | | | | | | | |
| Intermediate Shaft Gear | 6"3A | 2AC | 5-3/4" | A4150 | .256 | 2.10 | .056 | .030 | .028 | .100 | .133 | 3.40 | 5.415 | 1.813 | 1.490 | 1-1/8 | 2-1/2 | 11/16 | | 12.6 | 35.2% |
| Clutch Shaft Gear | 6"3A | 2AC | 5-3/4" | A4150 | .254 | 2.00 | .056 | .030 | .037 | .100 | .119 | 3.80 | 5.515 | 1.699 | 1.990 | 3/4 | 3 | 15/16 | | 10.8 | 46.9% |
| Small Spindle Gear | 8"4A | 2AC | 6-3/4" | A4150 | .283 | 2.40 | .066 | .030 | .053 | .100 | .110 | 3.40 | 6.415 | 1.446 | 4.480 | 1-1/4 | 5-1/4 | 3/16 | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | | AVERAGE | .199 | 1.92 | .046 | .030 | .035 | .100 | .096 | 3.17 | | | | | | | AVERAGE | 10.3 | 44.6% |

**Comparison chart** for turret-lathe-vs-chucking-machine costs shows great variation in results on similar parts. Breakeven points ranged from 1.4 to 29.1 pc; savings from 19.8 to 57.7% on this group of parts

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*Case study:*

# SLUGGING AT CONTINENTAL MACHINES, INC

**Typical parts** in Continental slugging program; note simple shapes of solid bronze disk (lower center) and steel piston, both of which showed high-percentage savings

TYPICAL SLUGGING DATA—TIME AND SAVINGS

| Material & dia | Lot size | Turret time | Saw time | Chucking Time | Hours saved | % time saved |
|---|---|---|---|---|---|---|
| 2⅝ HR 8620 | 300 | 67.6 | 4.4 | 39.8 | 23.4 | 34.6 |
| 1¾ CFS 1117 | 280 | 44.0 | 4.6 | 40.4 | –1.0 | –2.2 |
| 2¼ HR 8620 | 250 | 64.6 | 2.4 | 32.5 | 29.7 | 45.9 |
| 1¾ HR 4150 | 90 | 17.0 | 2.0 | 15.0 | 0 | 0 |
| 1¾ CR 1112 | 170 | 18.7 | 2.5 | 16.9 | – .7 | – .4 |
| 2⅛ HR 4150 | 250 | 57.6 | 2.6 | 33.1 | 21.9 | 38.0 |
| 1½" BRASS | 475 | 85.8 | 1.6 | 37.0 | 47.2 | 55.0 |
| 2½" BRASS | 50 | 19.8 | 1.7 | 14.4 | 3.7 | 18.6 |
| 1½ BRASS | 150 | 22.3 | 1.8 | 9.5 | 11.0 | 49.3 |
| 1½ 1117 | 220 | 47.2 | 1.1 | 27.4 | 18.7 | 39.6 |
| 1½ CR 1117 | 60 | 11.9 | .4 | 8.6 | 2.9 | 24.3 |
| 1 9/16 CR 1117 | 60 | 23.6 | .7 | 10.5 | 12.4 | 52.5 |
| 1½ CR 1117 | 90 | 13.7 | .4 | 10.3 | 3.0 | 21.8 |
| 1 9/16 CR 1117 | 70 | 20.3 | .4 | 10.1 | 9.8 | 48.2 |
| 1½ CR 1117 | 170 | 30.4 | .8 | 16.8 | 12.8 | 42.1 |
| 1 9/16 CR 1117 | 210 | 53.7 | 1.2 | 30.6 | 21.9 | 40.7 |
| | Total | 598.2 | 28.6 | 352.9 | 216.7 | 36.2 |

**Slugs were cut off** on DoAll power bandsaw, then drilled when necessary and turned on a chucker. Two jobs caused losses, one broke even, but remainder all showed healthy savings

## Slugging . . .

During the tests the chucker time was fully used, but half the saw time and two thirds of the drill time were not required, so these machines could be used for other jobs, too. Labor rates for this kind of slugging operation should always be low because an operator can split his time between saw and drill. In addition, a chucker operator should be able to handle at least two machines on this kind of job.

**BREAKEVEN**

How large a lot is required to justify slugging? Mathematically the answer works out to about 10 pc on jobs that show a high-percentage saving. Calculations must include setup time, production rate, machine depreciation, and labor rate. But a more realistic answer would be somewhat higher. Note accompanying chart of lot size vs savings. The best lot size for slugging would be some convenient number of parts on the curve before it reaches maximum (p 135).

Obviously, slugging can be applied to small lots. These results were obtained by analyzing costs for a clutch gear:

| | *Cost: Setup & Production* | | |
|---|---|---|---|
| *Lot Size* | *50* | *100* | *500* |
| Turret lathe | $28.38 | 51.92 | 240.24 |
| Chucker, saw, drill | 17.27 | 26.70 | 102.15 |
| Savings | 11.11 | 25.22 | 138.09 |
| % savings | 39% | 48.6% | 57% |

**FRINGE SAVINGS**

Slugging saves on direct labor, but has additional advantages. The drawbacks to slugging—added tooling or setup time, and the use of more machines in the system—can be balanced against simpler materials handling, better work grip at the machine, lower bar inventory, and reduced power loads.

Slugging may offer advantages, if work shape and size are right, above and beyond those usually credited to chucking machines when they compete with turret lathes.

In addition to Warner & Swasey's experience with slugging, four case studies and one example on these pages show typical slugged parts.

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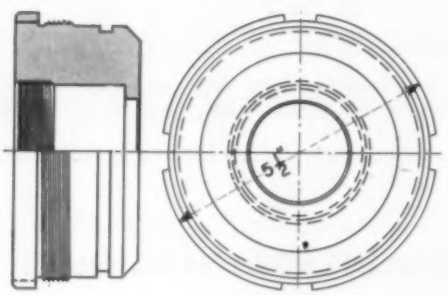
*Case study:*

## SLUGGING AT TOWMOTOR CORP

CLEVELAND—Advantages of slugging have been apparent here for some time, and the system has been carried on with turret lathes as well as chucking machines. Cost savings have resulted when hydraulic-cylinder parts were slugged instead of purchased outside or machined from forgings or castings. In addition, slugging has eliminated troubles with tolerances on dimensions and concentricity.

A typical part is a stuffing box for a tilt cylinder. This was made earlier from a forging, but is now slugged to save:

| | | | |
|---|---|---|---|
| Forging 15 lb | $.22/lb | | $3.30 |
| Bar 18 lb | $.075/lb | $1.35 | |
| Sawing | | .25 | |
| Drilling | | .30 | 1.90 |
| Saving | | | $1.40 |




**Tilt-cylinder stuffing box** is AISI C-1117 steel, made previously from a forging but now slugged for a saving of 42.4%, including cost of saving and drilling hole

Some parts designs have been modified for easier handling on the chucking machine, and some are now made for weldments. Maximum use of standard tools has been realized by standardizing such details as radii.

Lot sizes of 400 pc are now practical, which reduces inventory of finished parts. Bar stock cut to length is gripped more positively in collets, and the work does not slip back under heavy cutting loads. Higher cutting speeds are possible, too, because vibration is much lower than with whole bars. Some double slugging is done—stock for two parts is cut off, the parts are machined, then cut apart at the second operation.

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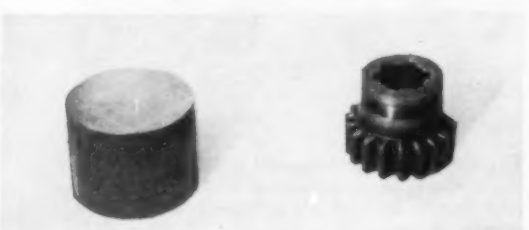
*Example:*

## . . . AT ARMSTRONG-BLUM



**Hacksawed slug** turned on automatic chucking lathe is gear blank. Because Armstrong-Blum makes hacksaws and bandsaws, slugging has been standard method for many years

*Case study:*

## SLUGGING AT JEFFREY MFG CO

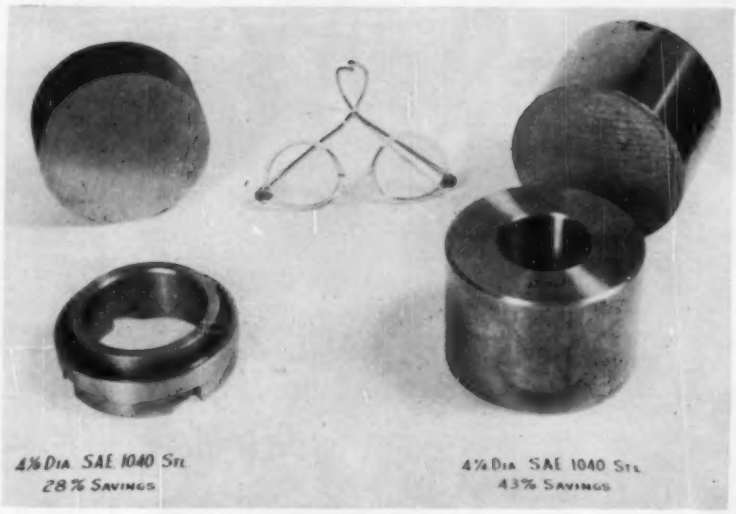
COLUMBUS, O—Slugging was proved out here to the satisfaction of shop personnel by a side-by-side comparison test where a 2600-pc lot of chain rollers was split, half going as bars to the turret lathes, and half being sawed by a DoAll and machined by a Warner & Swasey 2AC.

Up to the time of the test, the chucker showed production increases of 2:1 on castings, but had not been operated in a slugging program. During the test, turret-lathe time on the work was 12.7 min/pc, and chucker time plus time for sawing was 7.25 min/pc, a saving of 43%. The comparison was all the more convincing because the work was simple; and chuckers usually show advantages over turret lathes when work is complex.

Only two other jobs, so far, have been run on the chucker. One was a 1300-pc lot that showed 41% saving, and the other was a 50-pc lot that saved 28%.

Sawing is within required accuracy: 0.003 in. for parallelism and 0.008 max for length. Sawing speed is nearly equal to that for circular saw, and the cut is much narrower, so there are savings on material.

A large percentage of the bar jobs in the shop could be slugged but cannot be scheduled because of lack of capacity. In the meantime, bar jobs that can be scheduled on the chucker are compiling useful production data that will, in six months or so, present a complete picture of slugging for management.




**Job at right** was a 2600-pc lot, and was split between turret lathe and chucker. Savings proved to shop that the idea of slugging is workable. Important point was work simplicity—drill, bore, ream, face, and chamfer—because chuckers normally show best savings when work is complex

*Case study:*

## SLUGGING AT NIXON GEAR & MACHINE CO

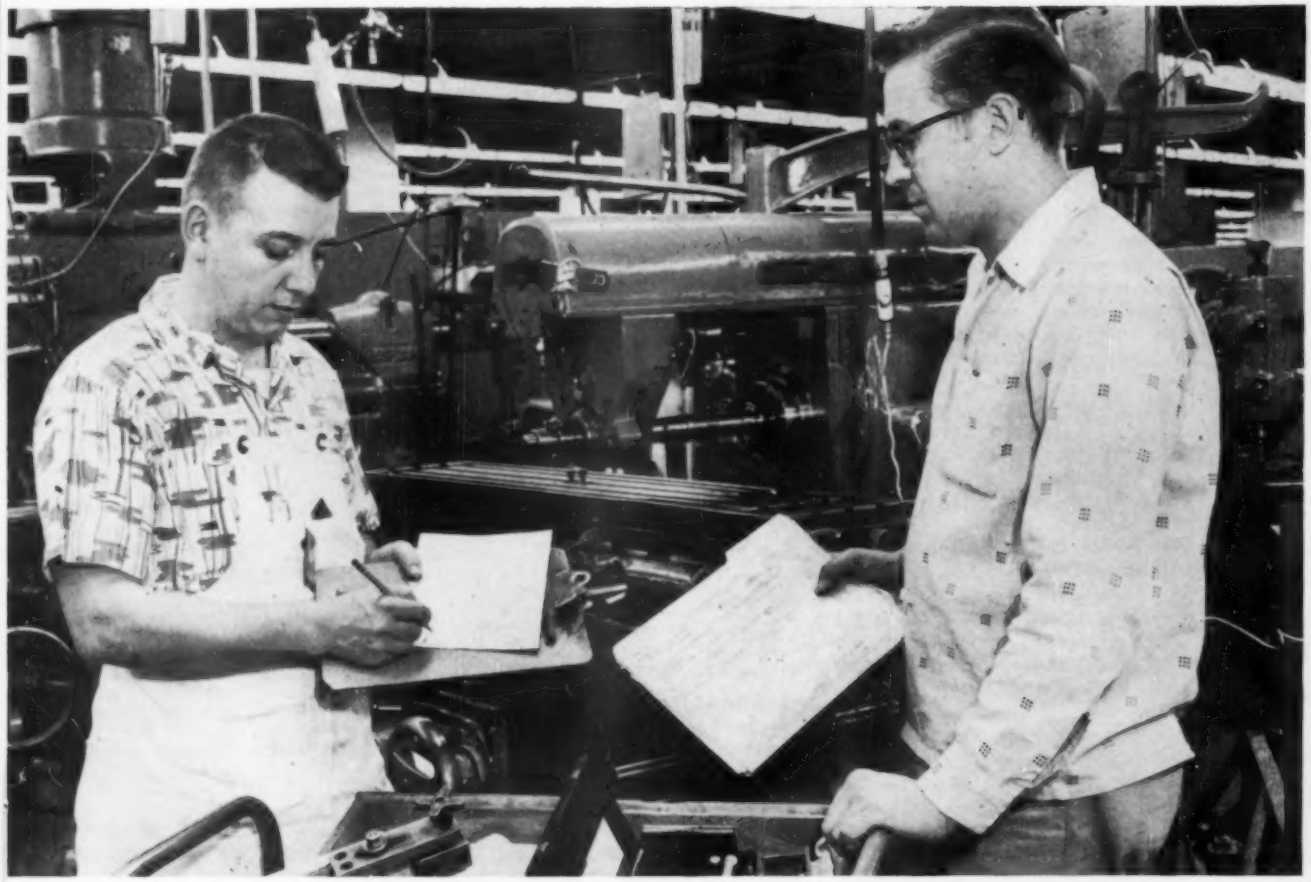
SYRACUSE, N. Y.—Experience here has shown that gear blanks can be slugged economically in lots as small as 25-30 pc and up. Breakeven points are determined by making test runs on the chucker and comparing total time to turret-lathe time according to past performance. On either type of machine conservative feeds and speeds are applied.

Blanks are sawed under contract by outside firms. If possible, the work is always turned complete in one operation to improve accuracy and economy. Gears are made for instrument applications to close tolerances—to 0.0002 in. for diameter and 0.0012 in. for runout.

| Part | Size & Material | Avg Lot | 2AC Time | T L Time |
|---|---|---|---|---|
| SJ-68 | 2⅜" x 1¾", C-1137 | 76 pc | 11.2 min | 17.7 min (from bar on T L) |
| Sprocket | 7" x 2½", C-1040 | 30 pc | 27.6 min | 39 min (from slugs on TL or AC) |
| 5M75 | 2¼ 2-7/32", C-1141 | 76 pc | 10.6 min | 20.7 min (from bar on T L) |
| Gear* | 2⅜, Aluminum | 500 pc | 8.1 min | 13.2 min (from bar on T L) |

* Tolerances are 0.0003 in. on bore with max lateral runout of 0.0015 in.

**Comparison chart** for Nixon slugging program, which showed less operator fatigue and less operator responsibility for accuracy. Reverse-feed feature on AC chucker allowed withdrawing tools without leaving marks on work



# Are you using... machinists as messenger boys?

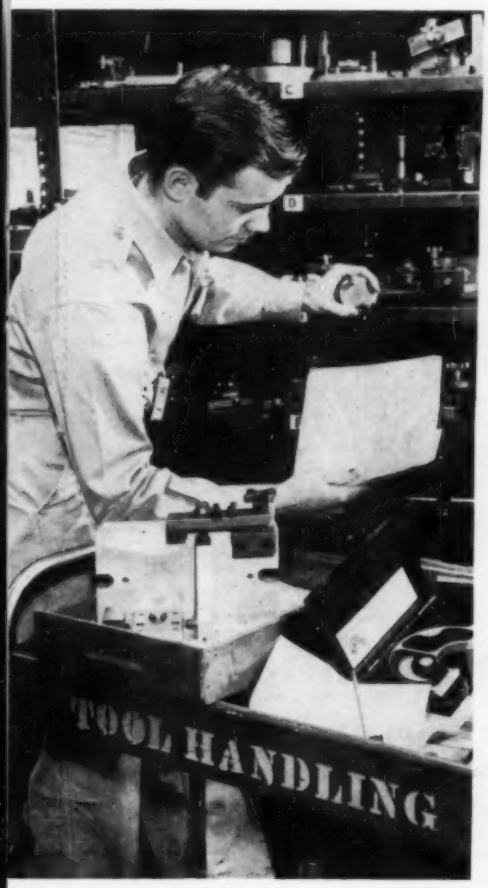
**A machine operator who has to run to a toolcrib every time he needs a tool is probably his company's highest-paid messenger boy. One company keeps its operators at their machines by packaging all tools and gages needed for a job, then delivering the packages to the machines before setup starts. Here's how the system eliminates confusion and saves time and money**

E C LUND,
plant manager,
Aeronautical Div,
MINNEAPOLIS-HONEYWELL
REGULATOR CO,
MINNEAPOLIS, MINN

Production efficiency can be boosted by scheduling delivery of tools and gages, as well as workpieces, to machines *before* they are needed. Today machine operators receive such high wages that trips they make to toolcribs waste both time and money.

A tool and gage "package" delivery service for machining areas at Minneapolis-Honeywell Co's Aeronautical Div plants has reduced to a minimum any need for an operator to act as a messenger between the crib and his machine.

With the system worked out by a committee made up of representatives of Planning, Industrial Engineering, Methods and Inspection, and interested shop supervisors, we now deliver tools and gages to machines at least 15 min before they




**Tool package and gage package . . .** are placed in cart at tool crib, ready for delivery to the machine specified on the job ticket, when released by the Planning office. Job-setup schedules are made up so that job tickets can be sent to the tool crib at least 2 hr before tools and gages will be needed. Packages are delivered to the machine by messenger from tool crib (see photo on opposite page) before setup starts. This messenger also returns used tool and gage packages to the crib after job is completed

are needed to set up new jobs. By that time the Planning office also has made sure that workpieces for the new jobs are in position near the machines. Now the machine operator has to visit a crib only when a tool or gage is inadequate for the specified job or when the wrong tool has been delivered.

Our tool and gage "package" for a machining operation consists of:

1. Tools specified by the Methods-Layout card for the operation to be performed.
2. Gages specified by an Inspection-Procedure card for the operation.
3. The Methods-Layout card.
4. A drawing of the part.
5. A job ticket for the operation.
6. The Inspection-Procedure card and the Quality-Control chart for the operation, in an inspection folder.
7. The original copy of a tool checklist.
8. The original copy of a gage checklist.

### NORMAL CONTROL PROCEDURE

When the Planning office has determined the sequence of operations at a machining work center and has listed them on a time schedule, individual job tickets are made up. Each ticket lists work to be done, the machine tool involved, and when setup is scheduled to start. The tickets are then delivered to the tool crib, allowing at least 2 hr lead time for preparing the tool and gage package.

After receiving a job ticket, the toolcrib clerks pull the proper Methods-Layout card and parts drawing, then check to make certain that the specified tools are available. If they are, the tool crib notifies Gage Control of the operation to be performed and the scheduled starting time.

While the required tooling is being assembled in a tray at the tool crib, Gage Control reviews the proper Inspection-Procedure card (bringing it up to date if necessary) and then issues a gage checklist to the gage crib, where the gages are assembled in a tray. The tool crib is then notified, and the tool and gage packages are combined.

About 20 min prior to the scheduled setup time for an operation, Planning checks with the tool crib to verify the schedule and make sure that all tools and gages are ready for delivery to the machine; if everything is in order, the tool crib delivers the packages. At the end of each job messengers return the packages to the proper cribs.

If an item is missing from either package when the messenger picks them up for return, he notifies the foreman of the machining section involved. The foreman must then locate the missing item or sign reports that show the disposition of these items. When a tool or gage is removed from the machine for use somewhere else, the person responsible signs the tool or gage checklist, and is held responsible for return of the item to the proper crib after it has been used.

### WHEN ITEMS AREN'T AVAILABLE

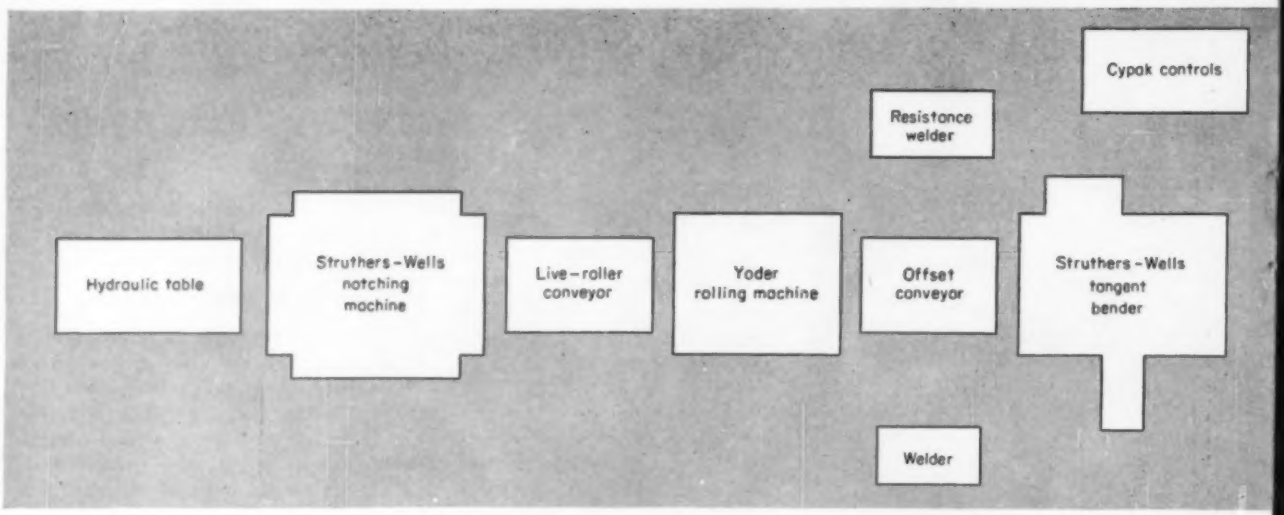
When tools or gages required for certain jobs are not available—because they are being used on other jobs, are in tool or gage rooms for repair or modification, or have not yet been procured—the following steps are taken:

1. Missing tools are reported by the tool crib to the supervisor of the machining section for which the job is scheduled. If other tools can be substituted, he prepares an alternate tooling list that the tool crib can follow to make up the tool package.
2. Gage Control provides an alternate gage checklist that the gage crib can use to substitute other gages for missing items.
3. Where substitutes cannot be provided, the tool crib returns the job ticket to the Planning office, so that another job can be substituted in the work schedule. The deferred job may then be scheduled for machining in some special setup or, if not needed to prevent delay in meeting a shipping promise, it may be set aside until the missing tools or gages are available.

### CORRECTION OF ERRORS

Both the tool and gage checklists that accompany the packages to the work center have columns headed "List Additional Items" for use by shop supervisors to note (1) corrections of errors in either list or (2) tools or gages required that are not shown on the lists.

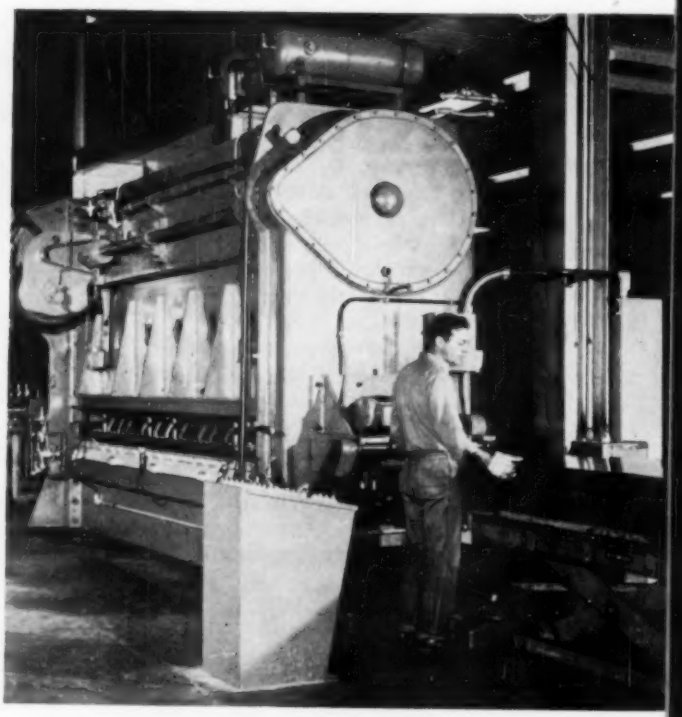
During the job run, the Floor Methods engineer reviews the tool and gage lists on which such corrections have been made and initials them to indicate that they are satisfactory and that proper parties will be notified, so that corrections can be made on the master Methods-Layout and Inspection-Procedure cards.



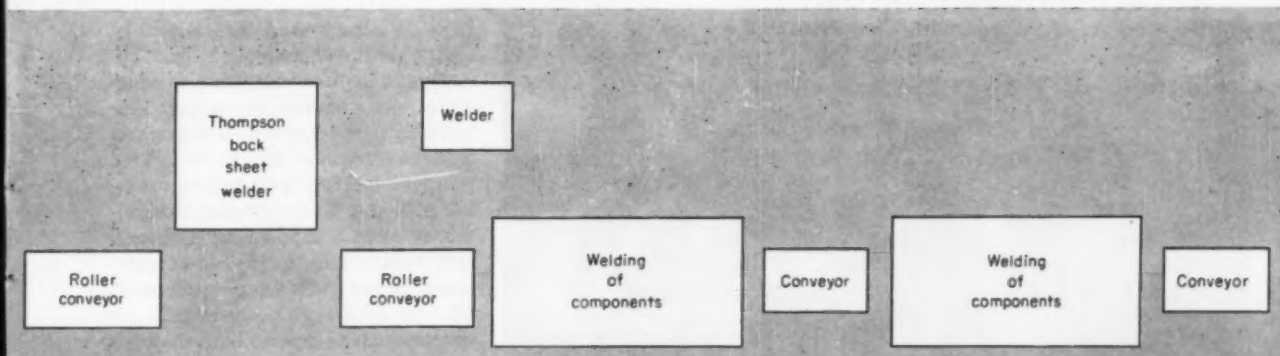

# FLEXIBILITY in a semi-automatic line...

GEORGE H DE GROAT,
Detroit editor

**speeds production of refrigerator cabinets at the Westinghouse Appliance Div in Columbus, Ohio. Operations include notching, piercing, rolling, forming, and welding to process sheet steel into cabinets, or "raw shells," ready for paint. Here are some of the outstanding features of the line**



**Start of the line** . . . is at a Struthers-Wells press, where sheared steel sheet is positively located and then trimmed on one edge, notched and pierced on both edges. Cam-operated slides cut trimmed strip into short sections of scrap




**Combined manual and automatic handling** . . . provides a high degree of flexibility in this line (shown in simplified block-diagram form) of special machines for making refrigerator cabinets. Static controls provide a reliable means of programming the equipment from start to finish

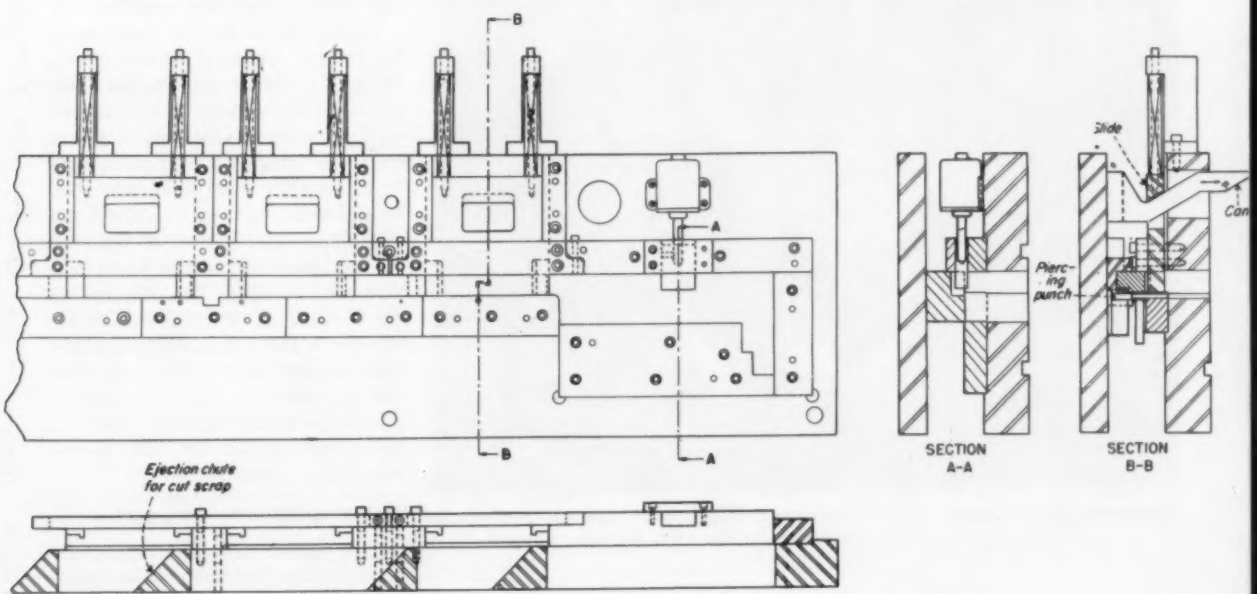
Low initial cost and a high degree of flexibility are two outstanding features of a new semi-automatic line that makes refrigerator cabinets at the Columbus Appliance Div of Westinghouse Electric Corp. To suit the current demand for "built-in" refrigerators, the one-piece, wrap-around cabinets have *square* corners. Previous specifications for cabinets of this type called for corner radii.

Flexibility of the new line is demonstrated by its ability to handle several cabinet sizes without extensive tool changes. Currently, widths of 24, 30, and 33 in. are produced in several lengths, from flat sheet stock (crs) in thicknesses of 0.032 to 0.048 in., depending on cabinet size. Production scheduling allows for a three- to five-day run of one size before changeover.

The line is set up to produce 150 cabinets an hour at 80% efficiency: from sheared lengths of sheet steel to finished cabinet, or "raw shell," ready for paint. Eleven to fifteen production workers on the line handle the assembly of such items as brackets and hinges, depending on the style and type of cabinet being made.

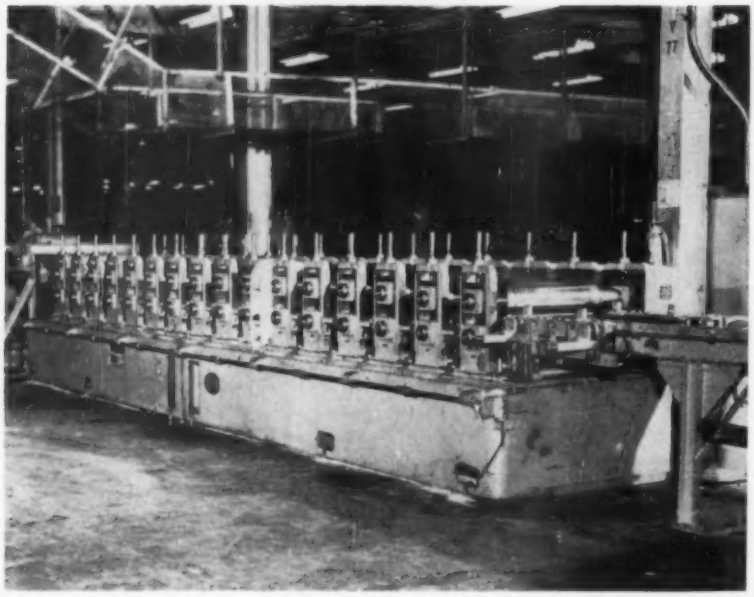
### UNUSUAL DIE DESIGN

At the start of the line, an operator feeds the flat sheet stock into a Struthers-Wells press in which a unique notch-pierce-and-

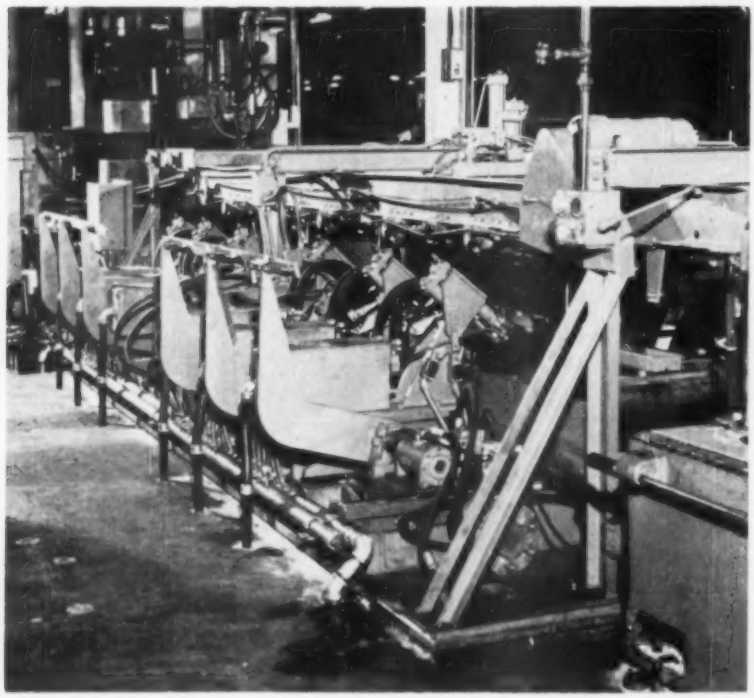



**All holes needed** . . . in refrigerator cabinet are made by this notching and piercing die in a single stroke of the press. Shearing portion of die trims sheet on one edge. Trimmed scrap is disposed of in the following manner: As ram descends, downward motion of cams releases springs that hold slides back. Slides then enter die area under stock, where they act as cutting edges against which the scrap-cutting portion of the shear punch operates. Simplified drawing shows only portion of die

**FLEXIBILITY in a semi-automatic line . . .**



**Magnetic top rolls** . . . on this Yoder machine pick up notched sheet for forming. This arrangement permits continuous operation not otherwise possible with notched sheets



**Wrapper sheet flanges** . . . are skewed in this setup (after forming) and a hinge bar is automatically welded in place. Operation, including transfer from rolling machine and delivery to next operation, is fully automatic

trim die is employed. Actually, this tool consists of two dies, one on each side of the sheet. On one edge the stock is notched and pierced; on the other edge it is trimmed as well as notched and pierced. The trimmed edge is later folded up to become the front of the cabinet and to form a support for a spacer and locator for a food compartment. Scrap strip that is trimmed off includes stock removed in notching on that edge, and may be as much as ¾ in. wide, depending on the width of sheet used and the finished width required. Ten cam-actuated slides on the trim side of the die operate to cut this sheared scrap into small pieces. Scrap is deposited on two belt conveyors in the machine for automatic removal.

As the press ram descends, the ten cams release springs that force the slides *under* the sheet stock. These slides have hardened-and-ground shear edges against which the shearing punches on the ram work. They are spaced alternately along the length of the die to present a series of steps that produce short sections of scrap. Inclined chutes built into the die under each slide guide the scrap sections into one of the scrap conveyors.

Punch construction is unique, too. Each shearing punch has a solid, or positive, portion that does the cutting and a spring-loaded stripper section adjacent to it and over the slide. The strippers back up against the slide while the positive section operates against the shear face. Retraction of the slide on the up-stroke of the press permits the scrap to be stripped by the action of the spring-loaded strippers. Interchangeable punches and dies are used in the rest of the die for conventional notching and piercing—including, for the first time, production of *all* hinge-mounting holes.

#### CYPAK UNITS CONTROL LINE

The entire line, including the press, is programmed with Cypak static controls that eliminate relays, switches, and other circuit elements with moving parts. With these controls, a "digital" signal (a sharp, discrete signal or impulse

of definite duration) is employed in logic functions that express a definite condition in the circuitry. Cypak, unlike conventional relays, accepts a number of input signals and provides a single output signal that can serve a number of functions. As a result, all machines on the line can be tied together to function in accordance with a predetermined program.

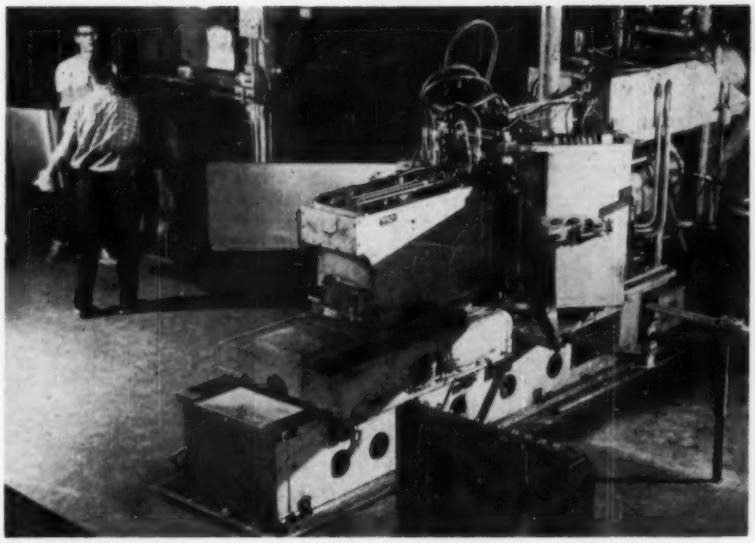
All machines are positively controlled for cycling in correct sequence. If one operation is not performed satisfactorily, production is halted. For this reason it is essential to have controls that are as free from trouble as possible and that will permit fast and simple location and correction with a minimum of downtime if trouble does occur. The Cypak elements, which answer these needs, operate primarily on magnetic-amplifier principles, with the addition of a fast-response "Ramey" circuit. These controls, which can be mounted in any position, have the further advantage of long life.

**AUTOMATION PLUS MANUAL HANDLING**

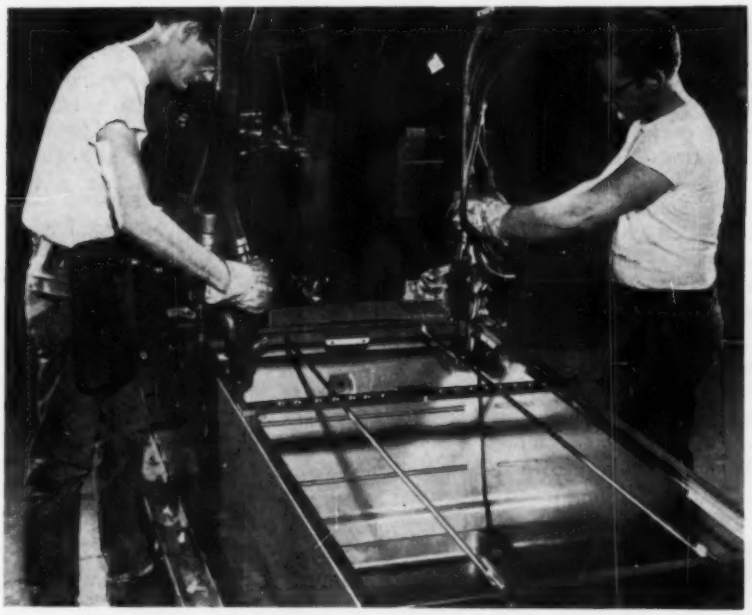
After being notched, pierced, and trimmed, the sheet is automatically transferred to a Struthers-Wells live-roller conveyor and gage table that feeds it to a Yoder rolling machine. Here it is rolled and flanges are formed on the sides to make a wrapper. After this operation it is passed on to another Struthers-Wells unit — an offset conveyor on which a hinge bar is welded in place. This operation is automatically performed, too (except for loading the hinge bar in place) by hydraulically operated resistance welding heads that are actuated after the bar is located and the sheet is clamped in position.

Next operation is to "U-form" the wrapper sheet, seam-weld the top front corners, and tack-weld the back sheet to the shell. Forming is done in a Struthers-Wells tangent bender, where two operators load the sheet into the bender and after the forming operation remove it and load it in a welder for the welding operations.

The work is now loaded on a transfer mechanism for removal to a Thompson welder, where the back is welded to the shell. Balance of the operations involve transfer of the shell through numerous welding operations on a conveyor system. Operators with manual welding guns join such components as the corner gussets, glides, and the bottom pan. Subassemblies—such as rear rails and rear panel strips welded to back sheets, clips joined to the hinge bars, supports, and angles for bracing the front sheets—are handled at installations adjacent to the line and are fed in as needed. Final operation is to convey the shells to the metal-finishing department.

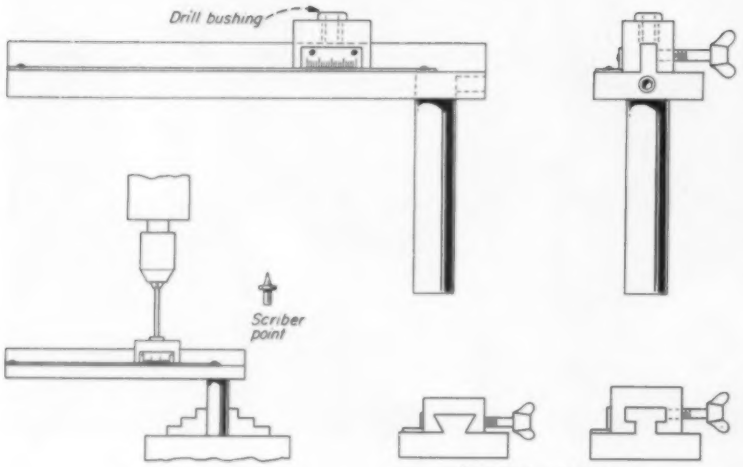


**Tangent bender** . . . produces a "U" shape in shell wrappers. This machine is handled by two operators, who load and unload it and carry the formed wrapper to a welder for seam-welding top corners and tack-welding the back sheet in place



**Automatic materials handling** . . . is combined with manual spot-welding operations for joining brackets, bottom pans, glides, and other components. Five stations are employed for this purpose; actually, six stations are available, so that flexibility and versatility of line can be increased

# Practical Ideas




## Versatile Bolt-Circle Finder Has Vernier Accuracy

This bolt-circle finder works quickly and accurately, and is most useful for small-lot or one of a kind jobs.

The illustrated tool is versatile because it can be used in a dividing head to set the speed-head spindle. In the lathe it can be used for cutting one or any number of circular grooves.

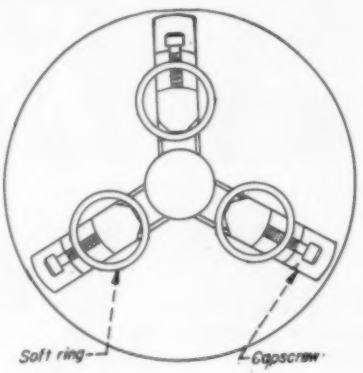
Although it is primarily intended for setting tools, the finder can also be used to scribe a circle. With a scriber point inserted in the locator bushing, the center shaft is held in the tailstock-drill chuck of a lathe, and the work is rotated against the scriber. A circle can also be scribed in the drillpress, but here the circle finder is rotated.

To make the finder, start with the scale beam. I chose a 9-in. length of good grade steel, 1½ in. wide by 1 in. thick. A plain rectangular vernier rail was milled in the center along one side of the beam. This rail can also be made separately and screwed on. More elaborate rails may be made if desired. The drawing suggests two: a dovetail, and a T-rail.

A hole was drilled and reamed at one end of the beam to receive the center shaft where a setscrew held it in place. A slide block was fitted to the rail and provided with a thumbscrew. This block carries a vernier plate, which can be manufactured or purchased, and which matches the scale fastened on top of the beam.

To correctly position the locating bushing, the vernier should be zeroed out and the shaft chucked and indicated. A hole is then drilled and reamed to take a standard No. 47 drill bushing.

*Alfred Raymond, Sr, Champlain, NY*




### Chuck Accuracy Improved By Pipe Rings

A three-jaw chuck seldom, if ever, runs true. When a large number of parts must be turned in such a chuck, and soft jaws are too expensive, small rings can be cut from iron pipe and clamped to the jaws to correct them.

Each ring is tapped and supplied with a capscrew. When secured to the jaws, the rings are given a cleanup cut with a boring tool to assure concentricity. Should the jaws be loose in the ways, it is best to apply strain to them by chucking a disk or large washer next to the chuck face before truing the rings.

When the rings become worn or damaged through extensive use, new holes are drilled and tapped at other locations and the true-up process repeated. The same idea can be used on four-jaw chucks to replace loose soft-metal shims to protect the work. The rings will then have to be cut from brass pipe.

*Detlef Schilling, Toronto, Canada*

### DO'S and DON'TS for MILLING MACHINES

DO . . . make sure the work is securely held before engaging the cutter.

DO . . . make sure that all tools and machine parts are clear of the cutter before starting the machine.

DO . . . handle all cutters carefully (a sharp cutter can cause serious injury if handled carelessly).

DO . . . keep the shirt sleeves rolled up above the elbows.

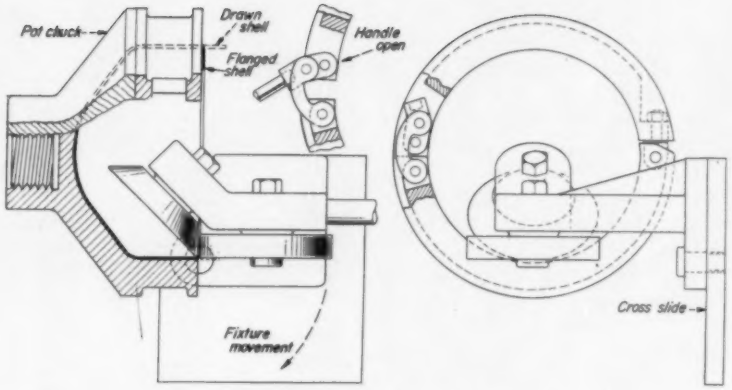
DON'T . . . attempt to remove any chips from the machine with bare hands (use a discarded paint brush or other suitable device).

DON'T . . . wear rings or long neckties while working around machine (a long necktie can be easily caught by the cutter).

DON'T . . . oil the machine while it is running.

DON'T . . . neglect to keep the gibs on the table, column, etc., snugged up for accurate work.

*Frank L Rush, Columbus, Ohio*




## Rollers Replace Costly Tooling

We were faced with the prospect of building a die to form an inward flange on a large number of drawn shells. It would have required intricate and expensive tooling, adding prohibitive cost to the job. An alternate solution was successfully reached with the simple tooling shown.

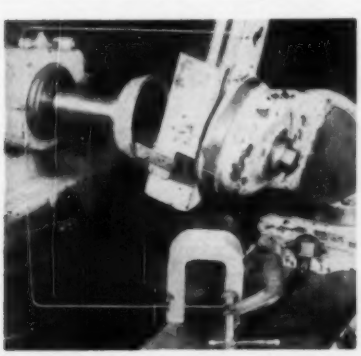
An old engine lathe was put to use. The spindle was fitted with a pot chuck to hold the shells. A cam-actuated strap was made as part of the outer rim of the chuck, allowing fast opening and closing. The workholding bore of the chuck was finished last to insure concentricity.

The compound was removed and the cross-slide was fitted with a fixture that carried two rollers, one with a 45° angle (the inboard), and one straight. The straight roller does the actual bending, while the 45° roller backs up the flange during the bending process.

Fixture is rotated 90° by hand through a lever located near the base in line with the straight roller. The fulcrum of this arch and the center of the radius on the angle roller are on the same axis. A specially made step bolt secures the fixture to the cross-slide, allowing rotation with a minimum of rocking.

The process is as follows: A shell is loaded into the chuck and clamped. The lathe is started and the carriage is moved forward to a predetermined stop while the cross-slide is adjusted to engage the work between the rollers. Fixture is then rotated to form the inward flange. The cross-slide is fed in until the rollers clear the flange. Lathe is then stopped and the carriage is moved back to permit the finished shell to be removed from the chuck.

*Alex W Knudsen, Rocky River, Ohio*



### Magnet Holds Improvised Safety Shield

Even though the operator of a machine may be wearing safety glasses, a properly placed shield affords the necessary protection for passersby or workmen at nearby machines.

The illustrated transparent shield can be quickly attached to any flat surface of a grinder or other machine tool at a small cost. We use 12-x-14-in. clear Lucite or Plexiglas, to which a strong permanent magnet is clamped. The pole ends of the magnet are then seated against some part of the machine where the shield will serve to its best advantage.

*H J Gerber, Stillwater, Oklahoma*

### Honeycomb Scrap Converted Into Useful Tooling Boards

The pattern shop at the Convair Fort Worth plant now makes good-as-new sandwich boards of about 90% of the aluminum honeycomb left-overs.

The new use for the scrap results in large savings in the plant's scrap-reduction program. Cut-off and odd-shaped pieces, of little use to anyone, are made into "boards" that can be used instead of steel in building tooling fixtures.

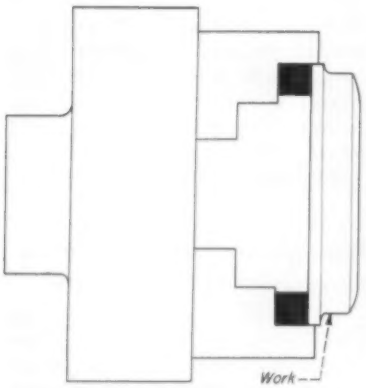
The pattern shop came up with a way to make the pieces "whole" again. They placed the scraps, patchwork fashion, on a table, and covered them with adhesive and a special fabric sheet. A thin sheet of metal is bonded over the layout to make a board.

The result is a 4 x 12-foot piece of material that is aluminum-light and strong as steel. These boards are used as frames and bases for fixtures, replacing heavy and expensive steel.

Slack periods are usually the time when the boards are made up. They are stored for use when needed and sawed to size like stock lumber.

*Ralph Trembley, La Jolla, Calif*

# Practical Ideas

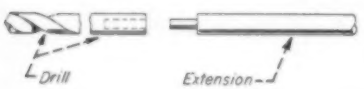



## Magnetized Parallels Stay On the Job

Parallels have always been important tools in the shop. One of their many uses is that of assuring parallelism of work faces in lathe work. Previously, parallels used to be wired to the jaws of the chuck to hold them in place when both of the operator's hands were occupied with manipulating the chuck wrench and the work.

Magnetized parallels have made the task of mounting the work much simpler. Instead of the old wire-up method, parallels of desired height are selected (determining the amount of stock gripped in the jaws) and placed, one on each jaw. The work is then chucked in contact with the parallels as usual.

*James De Biasio, Trail, B C, Canada*




## Piloted Extension Is Stronger

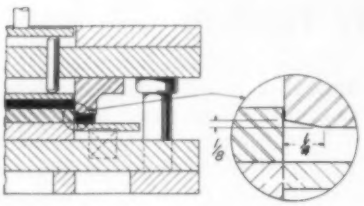
It is often necessary in our line of work to extend the length of our drills. We have tried several methods but have found the illustrated arrangement easiest and strongest.

A piece of drill rod is cut to the desired length for the extension. Its diameter should match that of the drill as close as possible, but must not be larger. A pilot about ½ in. long for a ½-in. drill is turned on one end. The diameter of the pilot is approximately 1/3 of the diameter of the drill.

The back end of the drill is then squared off, and a hole for the pilot is drilled. This should be sized to allow the capillary action to take place when the two parts are brazed together.

We have brazed extensions on steel and masonry drills by this method and have found it makes a stronger joint than butt-welding.

*Harry Miller, Sarasota, Fla*




## Negative Rake Produces Better Blank

As a rule, a blanking die made for sheet steel will work equally well on aluminum of the same gage. This is not a standing rule, as we found when we tried blanking ⅝-in.-thick aluminum.

Various clearances between punch and die were tried, but without success. We could not get a clean-cut blank. We finally put a negative rake on the die. This solved the problem. A blank with clean edges was the satisfactory result.

*Alex W Knudsen, Rocky River, Ohio*

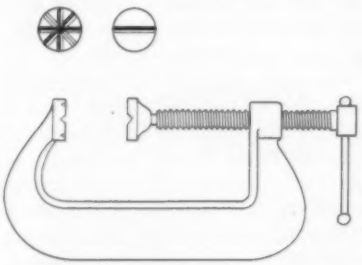
## "Squirrel Cage" Speeds Small-Parts Painting

Using the illustrated "squirrel cage," one operator can paint a batch of small parts in 3½ minutes that formerly occupied three men for a full hour.

By the old method, aluminum washers, clips, and spacers were spread out on a screen, each part separated from the others. They were then sprayed with paint and allowed to dry. A second screen was next placed on top, the entire unit reversed, the first screen was removed, and a second paint spray applied.

Now a batch of parts is dumped into the wire-cage drum which is turned rapidly by an air motor. An air blast from a 100 psi line below the drum keeps the parts from sticking together.

*Gordon Rasmussen, Seattle, Wash*



## Grooves Make C-Clamps Non-Slip

It is difficult to apply an ordinary C-clamp to rounded surfaces. The clamp has a tendency to clip off such work, largely because of the swivel action of the clamping-screw pad.

This can be remedied by filing a few small V-grooves across the stationary clamping surface of the C-clamp. The pad needs only one groove which can be matched to any of the grooves on the opposite face. A C-clamp so modified is no less useful for regular clamping jobs.

We use these clamps when we must hold small diameter rod for drilling and similar operations. They are also handy around the welding bench.

*E Mayover, Bradenton, Fla*

**SAMUEL J YASHO**
**Los Angeles, Calif**

**won $25 in addition to regular payment for his idea:**

**SNAPPING A TAP CHANGED TO TAPPING A SNAP**

**in the July 1, 1957 issue**

An extra $25 will be paid for the best Practical Idea in each issue of *American Machinist*. Selection of the winner is made by a group of our readers.

Our annual Production Planbook will reprint all winning ideas as a review. One will be chosen out of this issue as a winner of winners, and will receive a

**GRAND PRIZE OF $100.**

**JUDGES**—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in a tie, $25 will be paid to every co-winner. Decision of the readers will be final in each case.

**REQUIREMENTS**—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer, or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

**WHO MAY ENTER** — Anyone may enter except employees of the McGraw-Hill Publishing Co, Inc, and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

**HOW TO ENTER** — Send all entries to "Practical Ideas Editor," American Machinist, 330 West 42nd St, New York 36, N. Y.

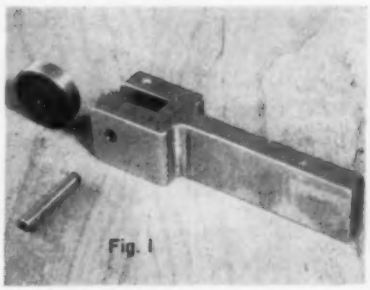


Fig. 1

## Roller Tool Has Many Uses In Metalworking

A hardened and ground tool-steel roller in a suitable holder is a versatile tool that may be applied to many standard and emergency operations on the lathe and other shop machines.

The illustrated tool, which has been in use for a number of years, has only three parts. The roller is made from high-carbon tool steel, the holder is sawed and milled from a piece of mild-steel bar stock, and the axle pin is a standard hardened and ground dowel pin.

The roller should be quench-hardened, and the tempering should be just enough to remove quenching strains. To finish it after hardening, the hole is first lapped to a free fit on the dowel pin. The peripheral surface is then ground concentric with the hole while the roll is mounted on a mandrel between centers. The radii on the edges of the roller are given a high polish with abrasive cloth, as is the periphery to which they are blended.

The axle-pin hole in the holder is drilled and reamed to a press fit for the dowel pin. This press fit provides the necessary grip on the pin for permanent assembly without use of setscrews. Lubrication is ducted to the roller by a small hole drilled from the top of the holder and through a small flat ground on the pin.

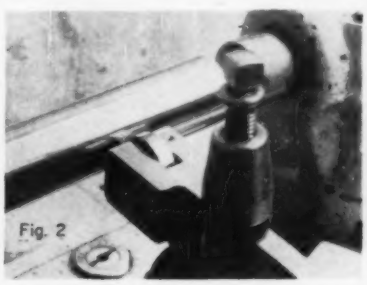


Fig. 2

Fig. 1 shows the roller tool disassembled. In Fig. 2 it is used to burnish the surface of a ground shaft. This produces a greatly improved finish, so desirable on shafts running in sleeve bearings. In this operation, the shaft is rotated between centers while the roller is traversed by power feed.

Some of the other uses we have put this tool to are metal spinning in the lathe over hardwood forms, and salvaging bushings which have been bored oversize. When pressure is applied by the roller to the OD of a bushing, it swages the work to a smaller diameter, after which the bushing is finish-bored to the correct diameter.

Roller may be used to speed truing up of work in the lathe. With the work semi-tightened in the chuck, the roller is fed against the face surface until the work runs true. Cylindrical laps and lapping disks can be charged by using this tool to impress abrasive compound into the surface.

*H J Gerber, Stillwater, Oklahoma*

## Rubber Inserts Rejuvenate Collets

Spring collets are abused in many ways. One of the most annoying is when an operator uses a collet for parts of diameters smaller than for what they were intended. The result is that there will be some difficulty in inserting and removing standard-size stock.

One way to overcome this fault is to carefully spread the jaws by inserting a screwdriver in the slits. Thin strips of rubber are then inserted into the slits, but not so they will protrude into the work-holding or clamping areas of the collet. If oil must be used on the work held by these collets, a synthetic oil-resisting rubber is preferable.

*W R Konle, Van Nuys, Calif*

# Round Table...

"Remember about a year ago when we first started Hanson on development work? Well, now we're going to have a whole development department to look into new materials and possibly new products."

"That's swell, Al; but that last time you mentioned it, the idea belonged to Harrison. What happened; you get converted?"

"I never was against it, Ed. I thought you were the one who was beefing about Hanson acting like a prima donna and not doing any work for you."

"Yeah, and it's been that way ever since. So he finally worked himself into a whole department, eh? I suppose they'll call him an empire builder and make him foreman."

"You guessed it, Ed. Now he's going to have two or three men to do nothing but experimental work—on plastics and light metals, among other things. It sounds like it might turn into something real big for the company."

"I was hoping the fever would pass, Al. I wish this outfit would stop dabbling in odds and ends and stick to ordinary steel fabricating. After all, it's what we made our reputation on and it's what we know. How can we compete with other outfits that have specialized in the newer materials? They don't try to compete with us, which shows good sense."

"The hell they don't compete with us, Ed! According to our sales department, we often lose out on contracts against other companies that you might suppose wouldn't know enough about welding and ordinary machining. That's the trouble. Everybody's getting into everything these days. So many outfits are diversifying; and we have to do it, too."

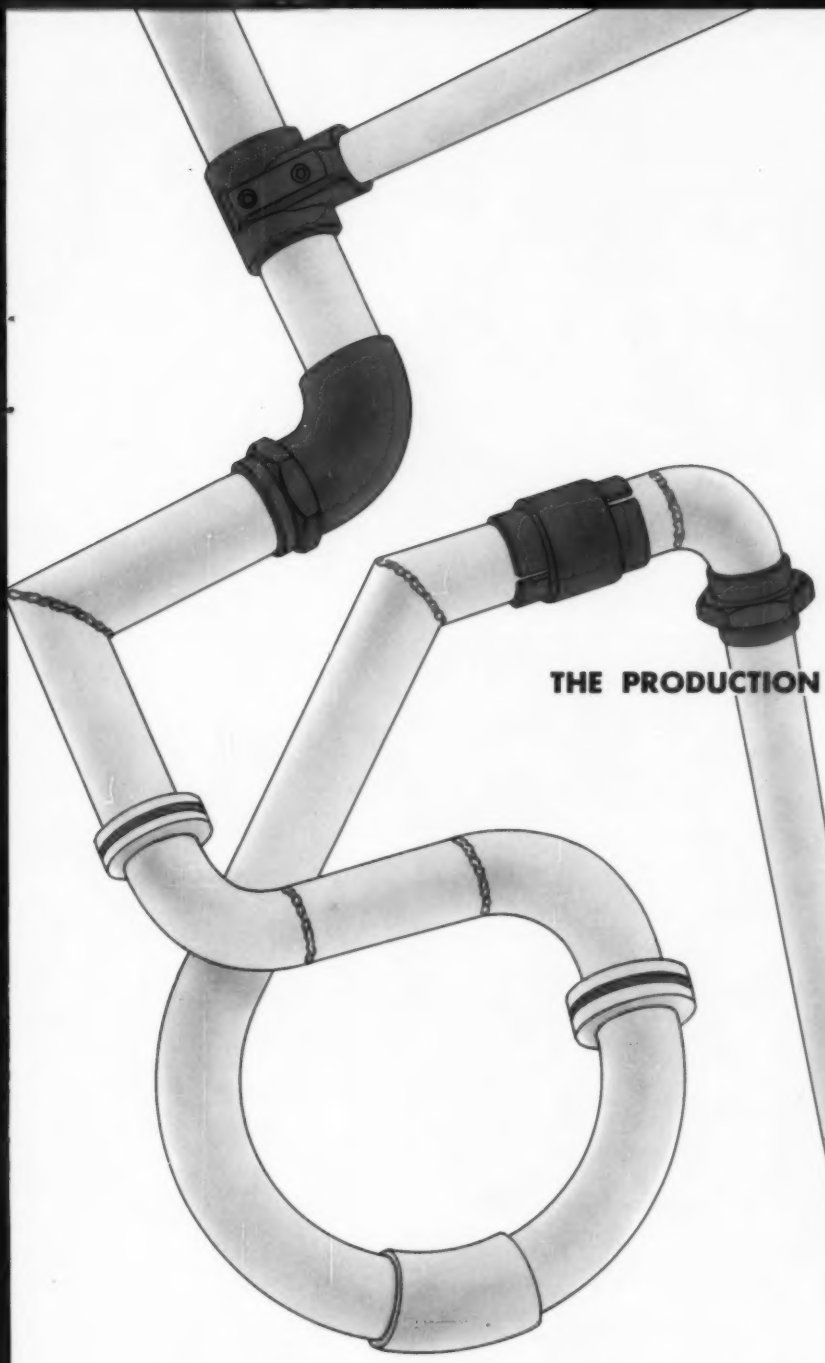
"I don't see why we can't keep making good products and making them in materials we know at a good profit, Al. We certainly have the know-how right in the plant here, and if years of experience count for anything, we should have an easy time of it."

"You're living in the past, Ed. Experience helps, but it doesn't guarantee a profit—not when another company can experiment and learn what you know, too. That's why we're going to have a development department—so we can keep up in all the new techniques."

• • •

# *Development Laboratory*

***Can an experienced company still stand*** its ground on past practice and expect to do well, or is it a better bet to start investigating other fields, too? Your opinions may help others. Discussions of earlier topics start on page 225.



American Machinist

Special Report No. 449

THE PRODUCTION MAN'S GUIDE TO

# JOINING WELDED STEEL TUBING

*Carbon · Alloy · Stainless*

**Here are 116 different ways to join a piece of welded steel tubing to another tube or to other parts. The methods fall into two basic classifications: welding and mechanical. Much has been published about specific methods of assembly for particular applications but no comprehensive review of them was available. Therefore several committees of ASTI pooled their resources to compile for you this picture-caption report. It includes, so far as possible, all the common joints and typical examples of many specialized or patented joints.**

Compiled by the Product Development Committees

Formed Steel Tube Institute

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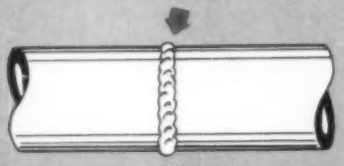
# WELDING METHODS

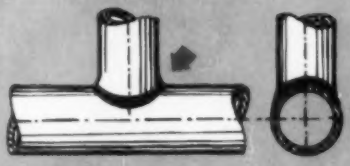
**Welded steel tubing may be welded by any conventional process. Tubing wall thicknesses and joint designs determine the welding method best suited to the particular application.**

## 1 ARC AND GAS WELDS

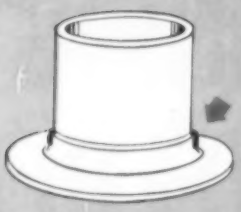
Arc welds are made by maintaining an electric arc between the weld rod (usually coated) and the work, the rod eventually being consumed by deposition of the metal at the weld location. Gas welding is done by heating the rod (usually uncoated) above its melting point with a flame of oxyacetylene, or other suitable fuel gas, at the location of the weld, so that the metal is deposited in the proper area.



**1A.** Arc and gas-weld joints are made by filling the V-notch formed by the two adjacent chamfered ends of tubing butted end-to-end, with weld metal, to form one long, continuous length.



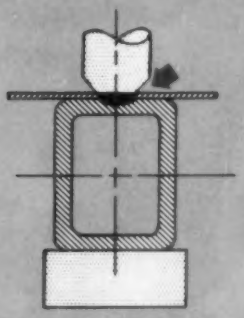
**1B.** A joint between two tubes is made by welding the properly formed and prepared end of one tube (the branch) to the wall of another tube (main), to form an angular joint. When this type of joint is used for conveying material, a hole of the proper size and shape is first cut through the wall of the main tube before welding. For structural or mechanical applications, no preparation of the main tube is required.



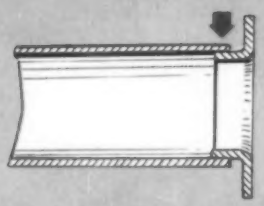
**1F.** The two halves of a stamping are joined around the circumference of a tube and the seams are welded together and to the OD of the tube at the same time.

## 2 SPOT WELDING

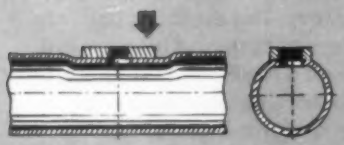
A spot weld (an electric-resistance weld) is made by passing a low-voltage, high-amperage current between the water-cooled electrodes of a specially designed spot-welder for a measured short period of time. The current, in passing through the two or more thicknesses of metal, welds them together over a small area, at the interface between the pieces. The top electrode usually is a truncated cone, whose tip is pressed tightly into contact with the metal, and the bottom electrode is a V-shape for round tubes, or a flat piece of metal for square or rectangular tubing.



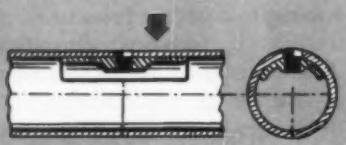
**2A.** Plate being spot-welded to a rectangular tube. The weld area at the interface between the two pieces is confined to the area immediately beneath the top electrode.



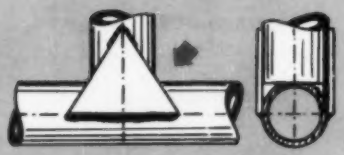
**2E.** Tube is joined to tube, or to another part, by a spot-welding operation similar to that employed to assemble the roller (Fig. 2D), except that the smaller-diameter tube is slipped over the other part rather than under. This is a particularly economical operation, especially in small quantities.



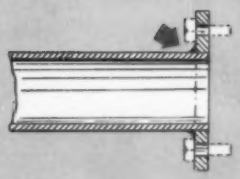
**2F.** A nut is spot-welded to the flattened area of tube wall for attachment of the tube to a hanger, a stud, or a bolt.



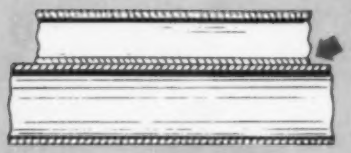
**2G.** An ID tube nut with a reinforcing pad, of the required size and shape, is spot-welded to the inside wall of a tube. A hole slightly larger than the threaded hole of the nut is drilled, or otherwise cut, through the tube wall at the proper location. This type of nut is used to provide a thread for attaching a hanger, a bolt, a stud, or a small-diameter tube to thin-walled tubing and, at the same time, reinforce the wall of the tube against additional weight and stresses of a branch line.



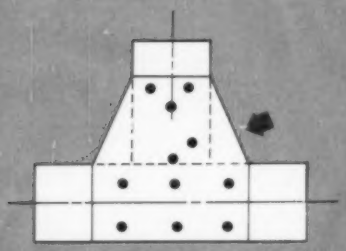
**1C.** Gusset plates welded to angular joints considerably increase their rigidity, strength, and resistance to distortion.



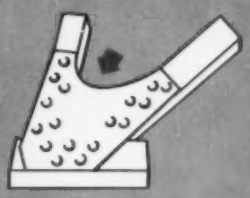
**1D.** Flanges are welded at or near the end of a tube for connection with a mating flange on another tube. This joint is used primarily in the field, as it requires no special tools or preparation of the tubing.



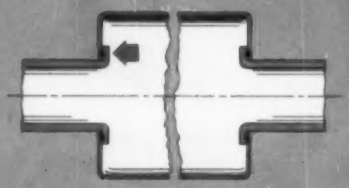
**1E.** Two tubes, usually one with a smaller OD than the other, are welded side-by-side, to form a vent for the larger tube, or as parallel fluid-carrying tubes.



**2B.** Gusset plate spot-welded to an angular assembly of square tubing considerably increases the joint's rigidity, strength, and resistance to distortion.



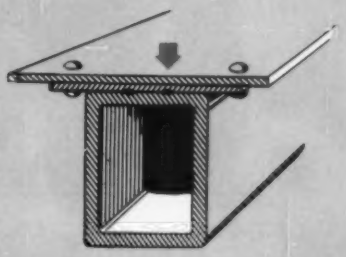
**2C.** Gusset plate spot-welded to an assembly of three square tubes in a multiple angular joint. The attachment of the gusset plate, or plates, considerably increases the joint's rigidity, strength, and resistance to distortion.



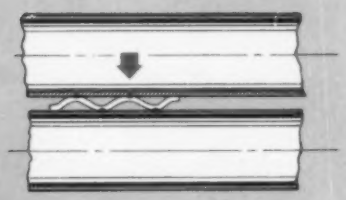
**2D.** With specially designed electrodes, many seemingly impossible welds are made with the spot-welder. Here, a large-diameter, thin-wall tube is the roller body, and small-diameter, heavy-wall tubes are the trunnions. The assembly is spot-welded to form the complete roller, with little or no additional machining or finishing.

# 3 PROJECTION WELDING

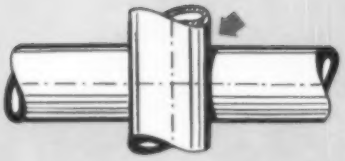
A projection weld is formed by passing an electric current through the two parts to be welded together. The heat of resistance at the interface makes the weld, concentrated by projections at the area where the weld is desired.



**3A.** Assembly of two plates riveted together is projection-welded to the square tubing.

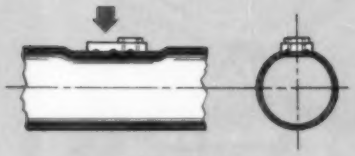


**3B.** Where two or more tubes are to be projection-welded together side-by-side, projections for concentrating the welding current may be provided by placing a formed stamping between the tubes. The welds are formed at the points where the stamping contacts the walls of both tubes.

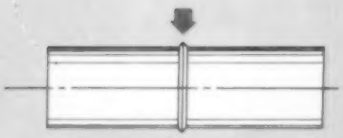


**3C.** Two or more intersecting tubes are projection-welded together where they intersect. This type of joint is used extensively for making tubular show and sample racks.

**3D.** Bent tubes are projection-welded together, regardless of their angular relations, where they meet. This type of joint is used extensively in making tubular furniture.



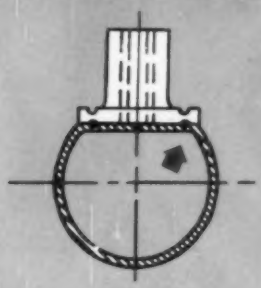
**3E.** A specially designed nut with ID threads and a tang is projection-welded by the current passing through several nibs on the tang's underside.



**3I.** Ends of tubing to be joined are flanged to 45°, matched together, and the current is passed through both tubes. The resistance at the joint generates the heat to weld the ends together to form a long length.

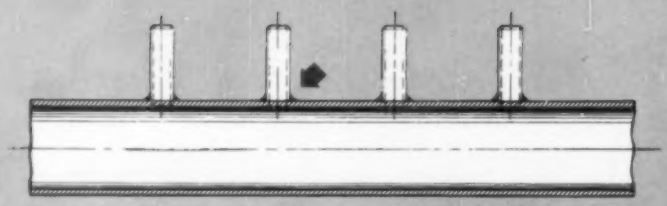
## 4 STUD WELDING

A process of electric-resistance welding whereby studs are welded to other pieces, usually for attachment of some other, non-weldable, material. Studs can bear threads on their OD, or on their ID. Tubular studs can be welded to tubes to form manifolds, and solid studs can be used as bearing surfaces or pivots for holding tubing in position.

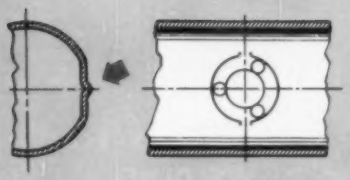


**4A.** Tubular stud with thread cut into its ID welded to a round tube. The area of the tube wall destined to receive the stud is flattened, to provide a solid footing for the stud before welding. If this assembly is to act as a manifold, a hole is drilled, or otherwise cut, through the wall of the tube, either before or after the stud is welded into place.

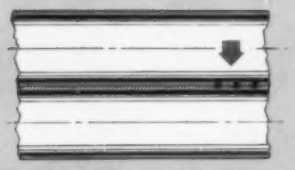
**4E.** Two solid studs, resistance-welded to tube diametrically opposite each other, act as bearings to hold the tube in position, or as pivots upon which the tube can be rotated.



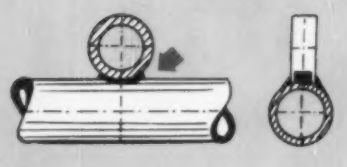
**4F.** Tubular studs, with threads on their OD, or on their ID, or without threads, are welded to a tube, to form a manifold or similar product. Holes in the tube wall at each stud location are drilled, or otherwise cut, after welding, or they may be cut before the studs are applied.



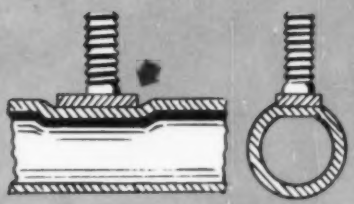
**3F.** A round nut, which can be made from tubing of the proper size and wall thickness, with ID cut threads, is projection-welded to the wall of a larger main tube, where nibs have been formed to concentrate the current. If desired, a hole can be drilled, or otherwise cut, through the wall of the main tube to provide a branch tube at this point. For structural or mechanical purposes, no hole is required in the main tube.



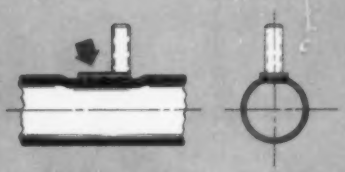
**3G.** Two or more tubes can be projection-welded together side-by-side by forming nibs at intervals on the walls of the tubing, to concentrate the welding current.



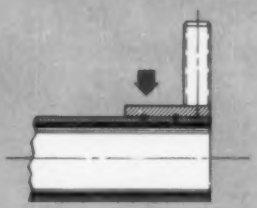
**3H.** A ring is projection-welded to a tube to provide a fitting for special application. The very narrow area of contact between the tube and ring provide concentration for the welding current. In this case, the assembly is used for an automobile gear shift lever housing.



**4B.** Stud with OD thread welded to a round tube. The area of the tube wall destined to receive the stud is flattened, to provide a solid footing for the stud, before welding.



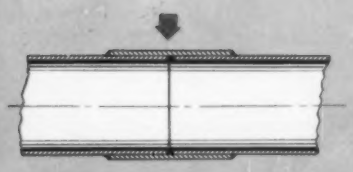
**4C.** Stud projection-welded to tube with nibs on stud's base to concentrate the welding current when the stud is applied. The area of the tube wall destined to receive the stud is flattened before welding, to provide a solid footing for the stud.



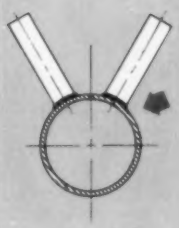
**4D.** Stud projection-welded to tube by first forming nibs on the tube wall to concentrate the welding current when the stud is applied. Shows stud applied to end of tube wall.

# 5 BRAZING

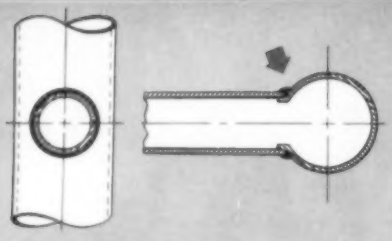
Practically all the arc- and gas-welded joints in the foregoing pages also can be brazed. Brazing is done by dipping an uncoated rod of suitable composition for the application into the proper flux and heating the rod and the braze area with a gas flame to melt the rod into place at the joint. Brazing does not penetrate the metal, but clings to the surfaces joined. A brazed joint is leakproof and withstands moderate temperatures and pressures. It is more easily made, at a much lower temperature, than a welded joint. High-frequency brazing is accomplished by joining the parts in a close fit, applying the flux and brazing metal in a suitable form and heating the assembly in a high-frequency induction furnace.



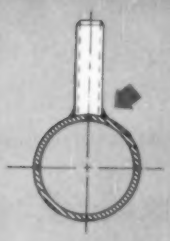
**5A.** To make this sleeve connection between two tubes, the ends to be joined are cleaned and forced into a close-fitting tubular sleeve. Rings of suitable brazing material are placed at each end of the sleeve and the entire assembly is heated in a high-frequency induction furnace. When brazing temperature is attained, the molten brazing material is drawn into the joint by capillary attraction.



**5B.** More than one stud, hanger, bolt, or other solid metal piece is attached to a welded steel tube by brazing with a gas flame, to support the tube, or to enable the tube to support some other part.



**5C.** Outlet or branch-type connection is made by drilling, or otherwise cutting, a hole of the proper size through the wall of the main tube, slightly flanging the edges of the hole outward, fitting the branch tube over the flanged hole, applying the flux and a ring of braze metal, and heating the assembly in a high-frequency induction furnace. When the braze metal melts, it is drawn into the joint by capillary attraction, and the joint is complete upon cooling.



**5D.** A small branch tube is attached to a larger main tube by brazing, following the proper procedure outlined in 5C, to build up a joint between the tubes. Or a branch tube may be joined to a main tube by holding the two tubes together in a jig, applying flux and a ring of braze metal to the junction of the tubes and heating the assembly in a high-frequency induction furnace; the assembly, as it is heated melts the ring and the molten braze metal is drawn into the joint by capillary attraction. In this case, a small tube with ID threads is joined to the larger main tube.

## 6 FITTINGS FOR WELDING AND BRAZING

Many fittings have been evolved for saving time and material in the joining of welded steel tubing. Some of the more commonly used of these fittings are shown in this section.

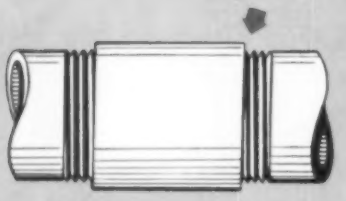
# MECHANICAL METHODS

Mechanical methods are used to join welded steel tubing in permanent, semi-permanent, and temporary installations. Many mechanical methods are used in sanitary or other applications that require frequent cleaning or overhauling. However, some of these methods, such as riveting, are permanent.

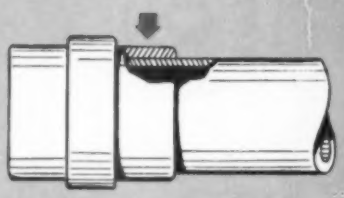
## 7 THREADED JOINTS

The most widely known and used mechanical method of joining lengths of welded steel tubing together, when wall thickness permits, is by means of threads cut into the tube walls at their ends. These threads can be male threads on one tube and female threads on a tube of larger diameter; they can be two male threads joined by a sleeve; they may be threads with the parts of threaded unions attached. Threaded tubes, although they require some appreciable time to assemble and disassemble, are used extensively for applications requiring an occasional disassembly, as well as for permanent installations.

**7A.** Standard union with V-type seat is used to connect two lengths of tubing. Easy to take apart for replacement or cleaning of tubing, yet capable of withstanding quite high pressures.



**7E.** Threaded joint with sleeve, where the OD of one end of each tube is threaded; a sleeve is tapped to match and used to hold the tubes together. A variation of this joint is one in which one-half of the length of the sleeve is tapped with a right-hand thread, with the end of one tube threaded to match, and the other half of the sleeve is tapped with a left-hand thread, with the end of the other length of tubing threaded to match; when the tubes and sleeve are assembled, and the sleeve is turned, it acts as a turnbuckle to pull the ends of the two tubes toward the center of the sleeve, to form the finished joint.



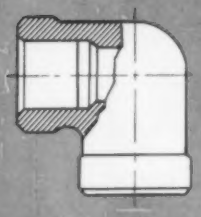
**7F.** The "twist-on" coupling is screwed onto a plain-end tube with a wrench until it sets on the top shoulder at the center of the coupling, impressing a companion thread in the wall of the tube. This joint is strong and rigid, and leakproof, at low pressures. The coupling forms its own thread on the tube, resulting in a watertight connection without reducing the wall thickness as cut threads do, and permitting the use of thin-wall tubing.

## 8 BOLTED AND RIVETED JOINTS

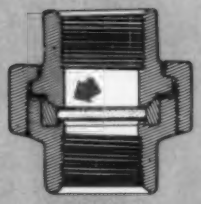
The treatment for fastening two or more welded steel tubes together, whether by bolting or riveting, in a mechanical or structural application, is the same, so both bolting and riveting are considered in this section as one method. The tubes may be flattened at the intersections or junction points, or they may be left unflattened, depending upon the requirements of the particular application.

**6A.** A tubular connector with a continuous nib marking its center. A tube is inserted into each end of the connector to the center nib; a light mallet blow drives the adjoining tubes together to virtually eliminate the crevice between their ends. The joint can be welded, brazed, or soft soldered. Very light-walled tubing can be joined with this connector.

**6B.** Union designed for welding, brazing, or soft soldering to tubing that must be removed occasionally. This union permits rapid assembly and disassembly of tube lines, and its useful life is practically unlimited.

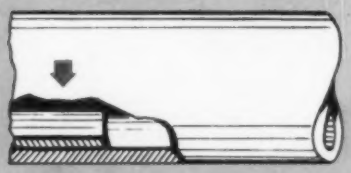


**6C.** Ell designed to make a permanent joint by welding or brazing the tubing in place in its ends. Other fittings available for this same type of installation are T's, Y's, cross-overs, caps, and plugs.



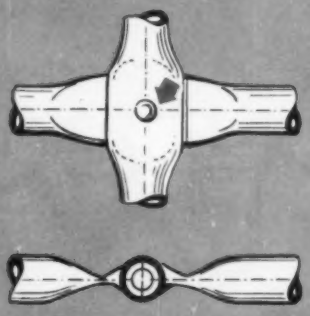
**7B.** Standard union with gasket seat is used to connect two lengths of tubing. Easy to take apart for replacement or cleaning of the tubing, yet capable of withstanding quite high pressures.

**7C.** Standard OD thread connection, where the end of the tube is threaded for connection with a fitting.

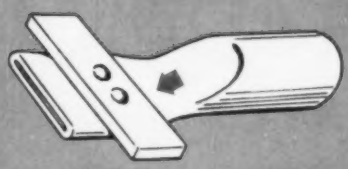


**7D.** Threaded and tapped joint, where the OD of one tube is threaded, and the ID of the larger tube is tapped to match. This joint is used only on tubes with heavy walls.

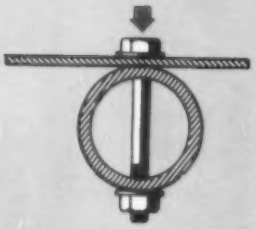
**8A.** A bolted, or riveted, joint, where the ends of two lengths of welded steel tubing are flattened and the bolt, or rivet, is put through matching holes and tightened, or driven.



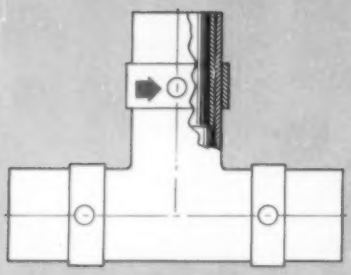
**8B.** A bolted, or riveted, joint, where two welded steel tubes intersect. Both tubes are flattened at the point of intersection, and a bolt, or rivet, is inserted through the matching holes and tightened, or driven.



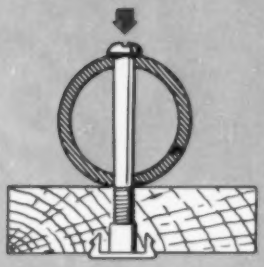
**8C.** End of tube flattened and bolted or riveted to a structural shape by drilling matching holes and inserting a bolt, or rivet, and tightening, or driving.



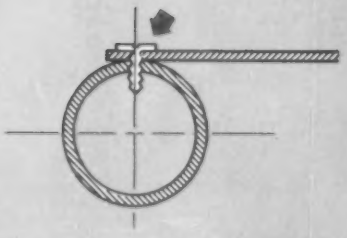
**8D.** Tubes and plates are bolted or riveted together by drilling holes through the plate and both walls of the tube; a bolt is inserted and tightened, or a rivet is driven through all the holes to complete the joint.



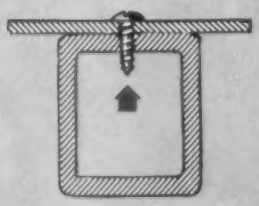
**8E.** Tubes are bolted, or riveted, to a T by fitting the ends of the tubes into the arms of the T, drilling holes through T and tubes, inserting and tightening bolts, or driving rivets.



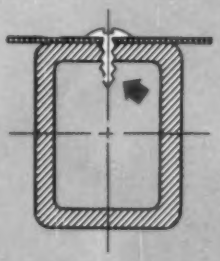
**8F.** For fastening tubing to wood, a specially threaded T-nut formed with sharp prongs is driven into the wood at the point of assembly, and the tube is attached to the wood with a suitable machine bolt engaging the T-nut.



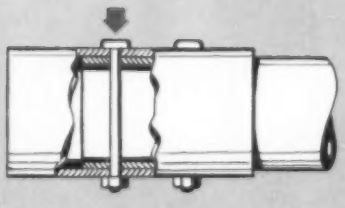
**8J.** Drive screws are used to fasten steel sheet to tubing for cabinet or shelf construction, or for ornamental facing. Holes are drilled, or otherwise cut, through both sheet and tube, and drive screws are applied to hold the assembly together.



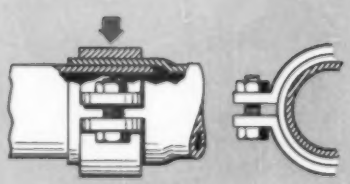
**8K.** The use of drive screws to fasten steel plate and tubing together requires that only one hole be cut into the tube wall, whereas bolts require that both walls contain holes. Where the wall is heavy enough to provide sufficient thread, the drive screw provides a satisfactory means of attachment.



**8L.** The self-tapping screw, shown here, is similar to the drive screw, with the additional advantage that it can be disengaged easily and be reassembled as many times as required.

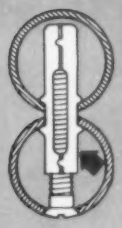


**9C.** This type of joint is made where a tube with the proper OD is inserted into the ID of a larger tube. In most cases, some machining of either, or both, of the tubes is necessary for the best fit. Telescoped joints are used in the fabrication of a tubular flagpole, for instance, where large-diameter, heavy-walled tube section is used at the bottom end, with successively smaller tubes adding height.

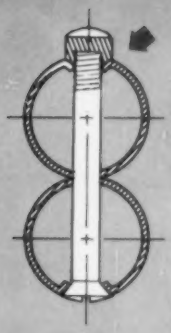


**9D.** By expanding one tube to telescope the other, a "bell and spigot" mechanical joint is formed that does not reduce the ID cross section. A split clamp holds the two parts together by compressing the outer tube.

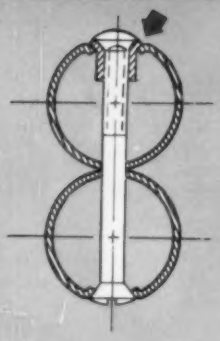
**9E.** The inside bead of this joint is preformed, and the outside bead is made after assembly with a hand beader. A deep bead makes this joint a permanent one, and a shallow bead makes it detachable.



**8G.** For joining tubes side-by-side holes are drilled, or otherwise cut, through both walls of one tube and one wall of the other. A split sleeve is inserted into the blind hole and through the second tube, after which a steel sleeve plug is driven into the sleeve, to tighten it and give additional strength. A disadvantage of this joint is that it loosens under strain by bulging the holes.



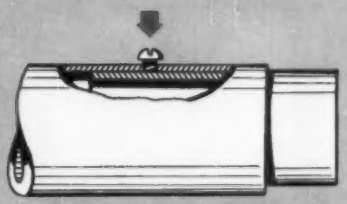
**8H.** For joining tubes side-by-side, holes are drilled, or otherwise cut, through both walls of both tubes. A bolt is inserted through all holes, and a special nut, as shown here, is used to give the joint a good appearance.



**8I.** For joining tubes side-by-side, holes are drilled, or otherwise cut, through walls of both tubes. A bolt is inserted through all holes, and a special nut, as shown here, is used to give the joint an improved appearance.

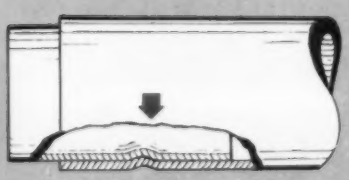
# 9 TELESCOPIC JOINTS

There is a wide variety of telescopic joints available for welded steel tubing. Some are secured by compression bands, some by set screws, some by bolts and rivets, some by beads formed on the tube walls, some by friction joints, and some by bayonet catches. These joints are used primarily where frequent adjustments to the overall length are necessary, or where quick assembly and disassembly of the tubing are required. They are not recommended where a strong pressure joint is needed, or where there is a considerable tension stress.

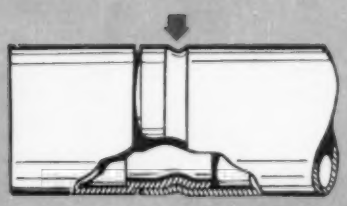


**9A.** Telescopic joint to join tube to tube. The outer tube is drilled and threaded for the setscrew, and the tubes are telescoped and held in place by tension on the setscrew. This is a simple, inexpensive method of joining where frequent adjustment of the tubing length is required.

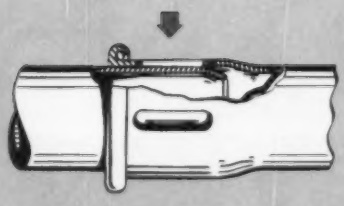
**9B.** The spring steel clip serves as a lockwasher under a standard round-head screw when clamping a split tube to a smaller tube. The clip curves away from the tube and is formed out-of-round so that tightening the screw compresses the spring, providing tension to hold the tube in place. This method, because of its flexibility, provides longitudinal adjustment and a vibration-proof assembly.



**9F.** Tube-to-tube attachment is used where tubes are telescoped and one, or more, indentations (dimples) are pressed into the tubes to lock them together. The depth of the indentation (dimple) determines whether or not the joint is detachable.



**9G.** The inside bead of this joint is preformed, with the end that is beaded being swaged to the depth of the wall thickness of the other tube. The outside bead is made with a hand beader after assembly, and the outside diameters of the tubes are matched. The depth of the bead determines whether or not the tubes are detachable.

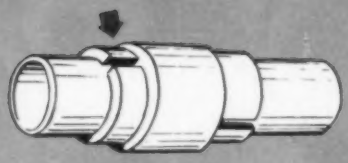


**9H.** Friction joint to join two tubes of the same diameter, usually with thin walls. One end of the tube is expanded, slotted and the end rolled over. The other tube is tapered to provide a slip fit with the expanded tube. Tubes can be coupled and uncoupled quickly without the use of tools, yet the joint is airtight at low pressures. Used on vacuum cleaner wands.

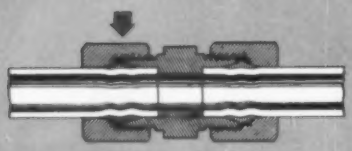
**9I.** Joint made by forming a bayonet lock on one tube that matches with projections upon the other tube. The tube holding the projections is swaged to proper size so that the OD of both tubes match. The joint is made by forcing the parts together and twisting. The joint has a high mechanical strength and pleasing appearance. Used extensively on vacuum cleaner parts. Tooling cost restricts the use of this joint to large-volume production.

# 10 COMPRESSION JOINTS

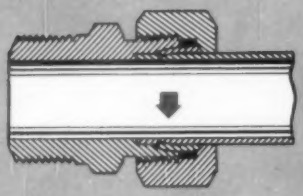
Compression joints are designed for use where two lengths of welded steel tubing must be held tightly butted together, but never where the joints may be subject to tension loading. There are many ways of holding compression joints: with tubular bands, with bolted split rings, and with threaded fittings.



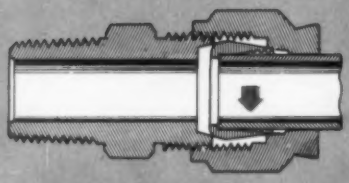
**10A.** This joint holds together two lengths of welded steel tubing of the same diameter for permanent or knock-down installations. It is economical, quick, and is easily made in the field. The compression fitting is made in two pieces — the sleeve and the ring. The sleeve consists of a short length of tubing of the proper ID to fit over the OD of the pieces of tubing to be joined; it is slotted alternately from each end to a point about midway of its length, so that it may be compressed slightly. The ring is a short piece of tubing that fits snugly on the OD of the sleeve, and may be driven over the sleeve, or the ring may be heat expanded.



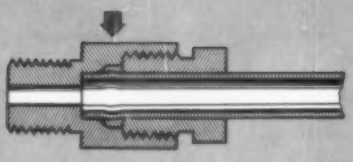
**10E.** A simple type of compression fitting, yet efficient. No preparation of the tube is necessary. The nut and sleeve are slipped over the end of the tube, the tube is inserted into the fitting body, and the nut is tightened to complete the joint. The pressure of the tube against the sleeve crimps the tube in such a manner that it will not pull loose under low and medium pressures.



**10F.** Fitting consists of three parts: the nut, the hardened steel sleeve, and the body. The nut and sleeve are slipped onto the tube, the tube is inserted into the fitting body, and the nut is turned up tight. As the nut is tightened, the beveled end of the body of the fitting forces the sleeve into the tube, which bites into the tube to insure a tight joint. This fitting is available as a union for joining two lengths of tubing together, and with a connector nipple for joining to some other threaded part.

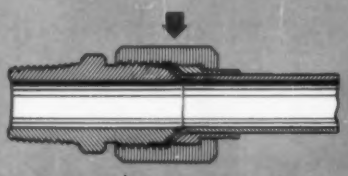


**10G.** Another three-piece fitting. The sleeve, however, is fitted with a shoulder that engages the end of the tube when the sleeve is applied. The back end of the sleeve is equipped with serrated edges that engage the tube wall when the nut is pulled up tight. This fitting is available as a union, a bulkhead union, connectors with either male or female threads, as elbows, and as T's. It is recommended for heavy duty service and relatively high pressures.

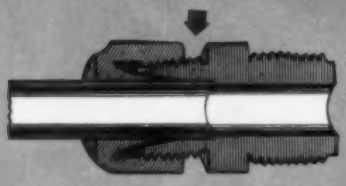


**10K.** Compression fitting is a two-part fitting originally, but the sleeve, inserted as a portion of the nut, shears off as the nut is turned up tight and grips the tube to make a tight joint. Available as a union or as a connector.

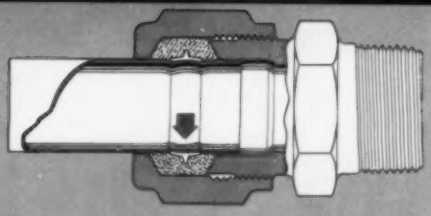
**10L.** Compression fitting for use with thin-walled tubing. It is a two-piece fitting, similar to regular 45° flared fittings, but with the flare seat inside the body of fitting. For use with this fitting, the tube end is flared before assembly.



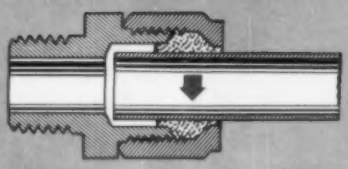
**10M.** Three-part compression fitting for high-pressure, high-temperature service under severe operating conditions. The tube end is flared to a 37° angle after the sleeve and nut are applied. The tube is then butted against the seat on the body, and the nut is pulled up tight to grip the flare between the seat and the nut.



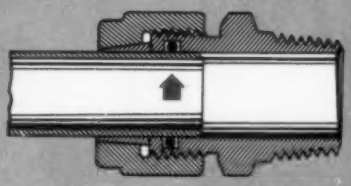
**10B.** Fitting, made with a nylon insert, is one of the simplest compression fittings, consisting only of the nut with an integral sleeve and the body. It is used where corrosion is a factor. The tube is inserted into the body of the fitting, and the nut is run up as tightly as possible to complete the joint.



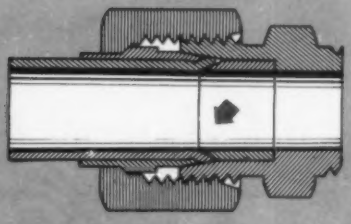
**10C.** Fitting, designed to resist vibration in use, consists of four parts: the compression nut, metal ferrule, synthetic rubber ring, and the body. Before assembly, a portion of the tube wall is indented to fit the metal ferrule. For assembly, the metal ferrule is slipped into place, the synthetic rubber seal ring is put over top of the ferrule, the end of the tube is inserted into the body of the fitting, and the nut is turned up tight.



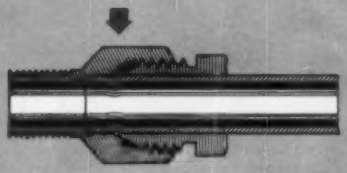
**10D.** Where vibration and shock are encountered, this joint is used. The fitting consists of three parts: the nut, the synthetic sleeve, and the body. The end of the tube must be flared slightly after slipping the sleeve and nut onto the tube; the tube is then inserted into the fitting body and the nut is drawn up tightly. The fitting can be obtained with both ends identical in a union, or with either a male or female connector to fit any specified threaded connection.



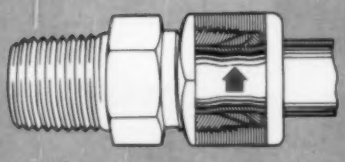
**10H.** Designed primarily for hydraulic line duty at high pressure — in fact, the higher the pressure, the tighter the seal. The O-ring is embedded in the ID of the body of the fitting, and the tube, after the split sleeve and nut are applied, is inserted into the fitting body. The joint is completed when the nut is pulled up one turn with the wrench after being hand-tight. No preparatory work is required on the tube except a slight chamfer of the end.



**10I.** For very high pressures, in the neighborhood of 20,000 psi and more. The slotted sleeve and the nut are applied to the tube, which is then inserted into the body of the fitting. As the nut is turned up tight, the end of the tube encounters a wedge-shaped hard metal insert that flares the tube to secure it permanently under the heaviest of service conditions.



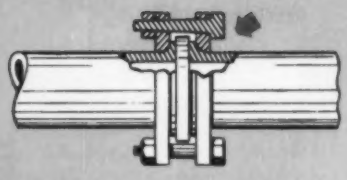
**10J.** A two-part fitting that combines the sleeve and nut in one part. The tube is inserted into the body of the fitting and the nut, as it is turned up tight, crimps the tube to hold it tightly in place. This fitting is for low and medium pressure installations.



**10N.** Fitting is assembled and turned finger-tight before the tube is inserted into the assembly. The nut is then turned up tight with a wrench to complete the joint. A complex system of metal wedges within the nut crimps the tube, to make the joint capable of withstanding high pressures and vacuums.

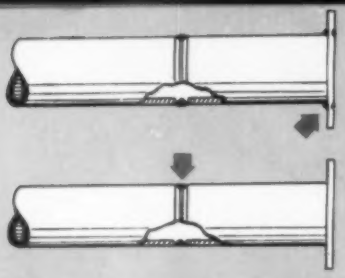
## 11 FLANGED JOINTS

Flanged joints require some preparation of the lengths of welded steel tubing before joining, but all the preparatory work can be done in the shop to expedite the installation of the tubing in the field. Practically all flanged joints can be used for carrying liquids, gases and compressed air, for they are practically leak-proof and capable of withstanding considerable pressure.

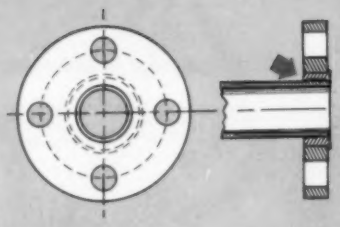


**11A.** A knockdown joint, suitable for carrying either gas or liquid at considerable pressures. The tubing must be flared slightly before installation. The joint is made by inserting the gasket between the ends of the tubes, sliding the flanges on from the opposite ends, bolting the flanges together and pulling the bolts up tight. This joint can be assembled and disassembled many times, with only the replacement of the gasket.

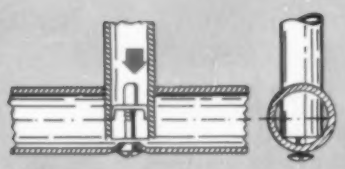
**11B.** A stuffing-box type of joint with 45° flanges. The flanges are flared on the end of each tube and the parts of the clamp are slid onto each tube and brought together. They are then turned up tight, pulling the joint together with no gasket necessary except when corrosive liquids are carried by the tube.



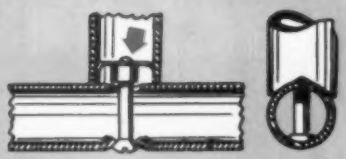
**11C.** The Van Stone flange offers one of the most convenient means of making a permanent joint in the field. The stub ends are formed in the shop, and it is necessary only to weld the ends to the tubing. Flanges slide onto the tube before welding the ends into place and are then brought up to the flanges and bolted together. Gaskets may be placed in the joints between the Van Stone ends.



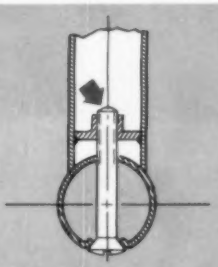
**11D.** This flange contains a ring of stainless steel within its carbon steel body, making it possible to use low-cost carbon steel for the portion of the flange that has no contact with corrosive fluids. A gasket inserted in the joint seals the joint and protects the carbon steel flange. This flange is threaded onto the ends of the tubing to be joined.



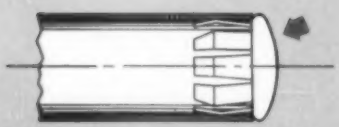
**12B.** This is a typical T-nut application for end and cross connection, in which the nut is spotwelded into a tube and the second member secured by the use of a suitable screw, as shown. This construction is especially adapted to knockdown assemblies, but it also is used for permanent joints. It is used for round stands or long stands of all sizes, and for all types of racks. Its chief disadvantage is that the screw is subjected to cross bending and loosens easily under load.



**12C.** In this joint, the T-nut can be spotwelded or arc welded into position at the end of the ID of the branch tube. The bolt goes through both walls of the main tube, where it engages the nut and is pulled up tight to form the joint. This assembly method is used for articles that are bulky, and that must be shipped knocked-down for reassembly at the delivery point.

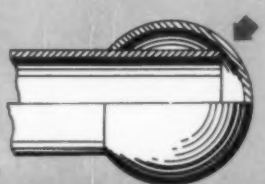


**12D.** The branch tube is formed to fit the main tube, the nut is arc welded to the ID of the branch tube, and holes to fit the bolt are drilled, or otherwise cut, through the walls of the main tube. The joint is assembled by matching the tubes, inserting the bolt through both holes in the main tube, engaging the nut, and turning the bolt up tight. This joint has a tendency to loosen under load if there is any distortion of the tube wall. This method is used for assembly of knockdown articles too bulky for shipment complete.

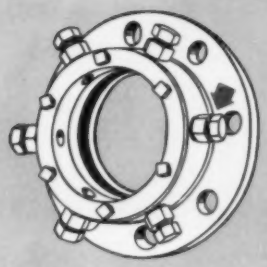


**13B.** This ornamental cap is used for ends of the tube requiring finish, or tube end protection of other surfaces.

**13C.** An end plug pressed into place to finish off the end of the tube for safety, decoration, and utility.



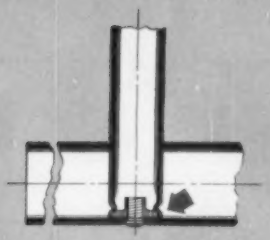
**13D.** This ornamental cap is used for tube ends, for table leg ends, chair leg ends, or other protruding ends requiring finish.



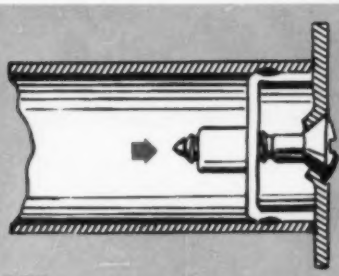
**11E.** Patented flange carries six set-screws around its circumference with which it is attached to the tubing. Six other screws force a gasket into place at the joint. The flanges mate up with standard flange facing, making it possible to repair leaks quickly and at low cost, with very little downtime required.

# 12 T-JOINTS

T's are formed with welded steel tubing by using specially designed nut-and-bolt combinations. These combinations include a nut that is rolled into the end of the branch tube, or welded into place within the branch tube's ID. The bolt usually can be obtained from standard stock to meet all but the most exacting specifications.



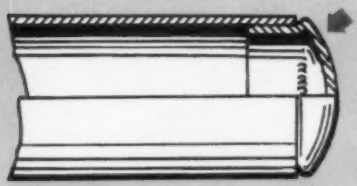
**12A.** In this T-joint, a special nut is rolled into the end of the branch tube. A hole large enough to accommodate the OD of the branch tube is drilled, or otherwise cut, into the wall of the main tube; a hole of the proper size for a bolt is drilled, or otherwise cut, through the opposite wall of the main tube. To assemble, the branch tube is inserted into the hole in the wall of the main tube, and a bolt is inserted into the small hole; the bolt is turned up tight to complete the joint. This joint is used in furniture, showcases, and in knock-down assemblies.



**12E.** A typical T-nut application for end and cross connection, in which the nut is spotwelded into the ID of a tube and the second member secured by a suitable screw, as shown. This construction is especially adapted to knockdown assemblies but it also is used for permanent joints. It is a method of connection for round stands of large size for all types of racks. The primary disadvantage of this joint is a tendency to loosen under loads.

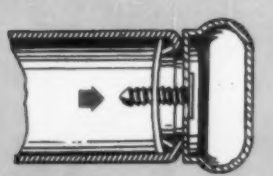
# 13 END FITTINGS

End fittings are designed primarily to finish off the exposed ends of welded-steel tubing where an unfinished end would be dangerous or unsightly, as in tubular furniture. Ends are of three general types: pressed, screw-and-bolt fastened, and bayonet catch. Pressed ends are inserted into the ID or pressed over the OD of the tube; screw-and-bolt fastened ends are held by a screw or bolt through a specially designed nut welded, or otherwise fastened, securely within the tube; the bayonet catch is used to hold a specially designed end, usually when the end is to be removed and replaced occasionally.



**13A.** An end plug, pressed into place to finish off the end of the tube for safety, decoration and utility. Also used by tubular furniture makers for chair and table feet.

**13E.** Joint produced by forming a bayonet lock in the cap which matches with projections formed on the tube. When forced together and twisted, a detachable joint of high mechanical strength and pleasing appearance is made. This joint is used on vacuum cleaner tools. Tooling cost restricts its use to large-volume production.



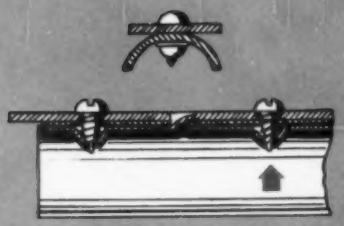
**13F.** End fitting for attaching a device to the end of a tube. In the above case, a glider is attached to the end of a tubular chair leg. As the stud is turned into the spring steel nut, the nut is forced down against the rolled-in end of the tube. This method can be used for attaching many devices to the end of the tube, and simplifies assembly of the end fitting.

**13G.** This is a special nut for attaching an object to the end of the tube. The barbed nut is forced into the end of the tube, the object to be attached is positioned and the screw is driven. The arch of the nut is pulled down and the barbs are forced into the ID of the tube, providing positive anchorage. This assembly method eliminates such operations as forming, threading, and welding, prior to assembly.

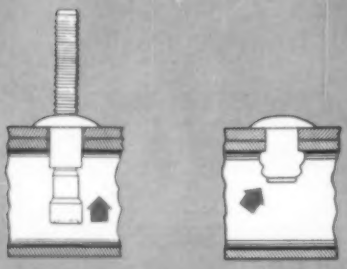
**13H.** This nut is designed to attach objects to the end of a tube. The special nut is slipped into a slot in the tube and held in place by a screw. This nut is self-positioning, and can be used for attaching numerous devices to the end of the tube.

# 14 PATENTED FASTENERS

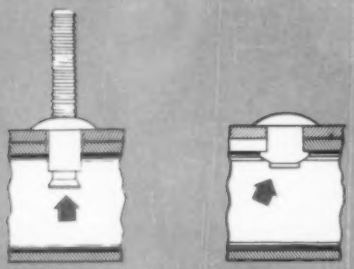
A wide variety of patented screws, bolts, rivets, and other fasteners are available for the attachment of lengths of welded steel tubing to other lenghs of tubing, or to other materials. Some of the more widely used representative patented fasteners are shown in this section.



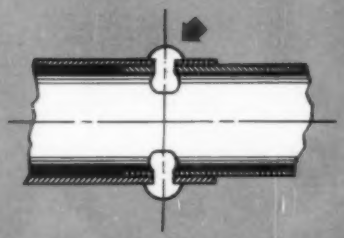
**14A.** Clip designed for fastening plate or strip to the side of a tube with sheet metal screws when the tube walls are too thin for threading. The clip is positioned inside the tube and held in driving position by a small projection of metal through an extra hole in the tube, to insure a positive connection. Screws are driven through the piece to be attached and into the nuts in the clip. This method eliminates threading of screw holes in the tube.



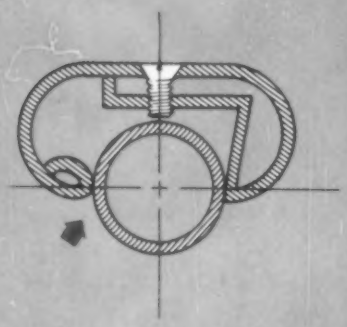
**14E.** This is one of two types of huck rivets that can be used for attaching parts to tubing by expanding the rivet in a blind hole in the tube wall, riveting the part permanently to the tube. These rivets require the use of a special riveting gun, and the operation is relatively expensive because of the cost of the parts consumed in making the joint. The results, however, are satisfactory and of good working appearance.



**14F.** This is the other of two types of huck rivet used for attaching parts to tubing by expanding the rivet in a blind hole in the tube, to rivet the part permanently. These rivets require the use of a special riveting gun, and the operation is relatively expensive because of the cost of the parts consumed in making the joint. The results, however, are satisfactory and of good working appearance.



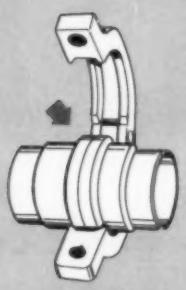
**14G.** An explosive rivet carries a small charge of powder in a cavity in its small end, which is exploded by a special heating device after the rivet is placed. The application is to blind spots or locations where the inside of the tube is inaccessible.



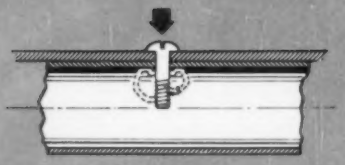
**14K.** A method of attaching a hollow shape to a tube. In this application, the hollow plastic arm is attached to the tubular chair frame. The steel clip is sprung open far enough to slip over the tube, and the arm rest is positioned and held by a screw.

# 15 SANITARY FITTINGS

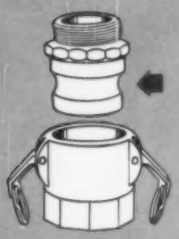
Lines of welded stainless steel tubing, used for handling foods — particularly dairy products — must be cleaned daily to avoid contamination and tainting of such foods. The least time required for cleaning means the most time the lines are available for productive operation. This is where quick-acting sanitary fittings make themselves most useful, for the lengths of tubing they hold together are most rapidly taken down, cleaned, and reassembled. Two distinctive styles, typical of all such sanitary fittings, are shown in this section.



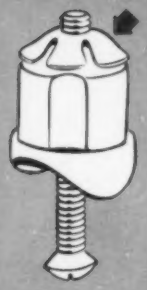
**15A.** Stainless steel fitting joins the tubing together with a leakproof joint, capable of withstanding quite high pressures. The ends of the tubing are properly shaped to receive the fitting, which is slipped over the joint, closed and fastened with a bolt and nut.



**14B.** Patented speed nut, projection-welded to the ID of the tube, affords a convenient method of attachment where the location is close enough to the end of the tube to allow the entry of the electrode for welding. This nut does not affect the appearance of the assembly, as it is inside the tube.

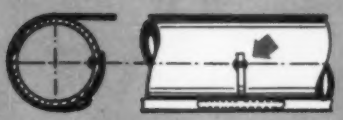


**14C.** Quick-acting coupling is operated by attaching each of its elements to the tubing by threads at one end, then matching the two elements together and pressing the two levers down to close the joint.

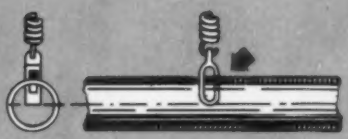


**14D.** These fittings, made entirely of metal, are available as joints for wall and floor flanges, 90° elbows, and as T-butt connectors. The lock is made by turning the screw until the spring clip engages the ID of the tube, to hold it tightly in place.

**14H.** Expanding nut is inserted into a hole in the tube and locked into position, leaving the tapped hole to accommodate a screw for attaching other parts to the tube.



**14I.** Upholstery clip snaps into a hole in the tubing and holds the plastic or fabric straps that form the seat. This clip is easily detached when it is necessary to tighten or replace the straps. The strap is threaded through an opening in a special stamping and the stamping is snapped onto the tubular frame, locking into a hole drilled in the frame.

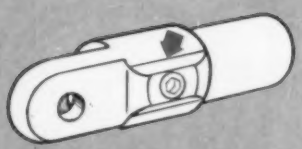


**14J.** Clip designed for the tubular furniture industry for fastening various devices to the side of the tube. The clip is pressed into a hole in the tube and the spring is hooked into the holes in the end of the clip. The clip is held rigidly, due to the armlike prongs projecting inside and outside the tube wall. This attachment is simple and inexpensive for attaching springs, rings, hangers, etc.

**15B.** Stainless steel fitting joins the tubing together with a leakproof joint, capable of withstanding quite high pressures. The ends of the tubing are properly shaped to received the fitting, which is slipped over the joint and closed with a lever clamp. A special tool is required to open and close this fitting.

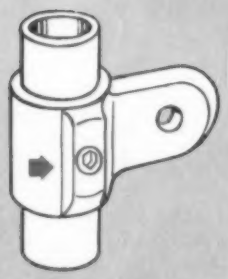
# 16 MECHANICAL FITTINGS

Patented mechanical fittings now are available in a number of styles and sizes for making almost any joint necessary to hold welded-steel tubing in structural or mechanical applications. These fittings, supplied with socket-head screws to hold the tubing, offer quick assembly and disassembly — temporary or permanent. A patented connector with set screws for making easily assembled and disassembled tubing connections also is shown.

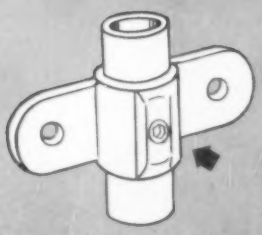


**16A.** Socket swivel fitting for joining tubing to another swivel fitting, or to some other part. This fitting is applied to the end of the tube.

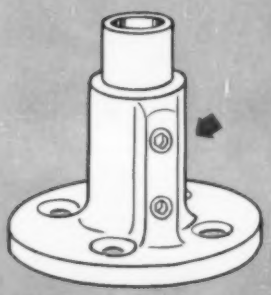
shown in this section.



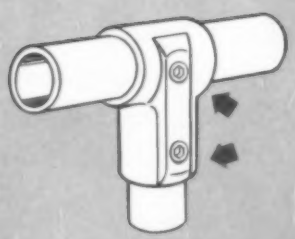
**16B.** Right-angle swivel fitting, with swivel positioned at side of fitting instead of at end, as shown in Fig. 16A. It is used for the same purpose as the socket swivel fitting, except that the tube passes entirely through the fitting.



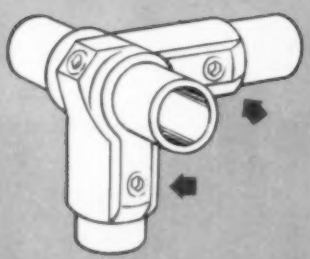
**16C.** This fitting is the same as Fig. 16B, except that it has two swivels attached — one at either side of the fitting.



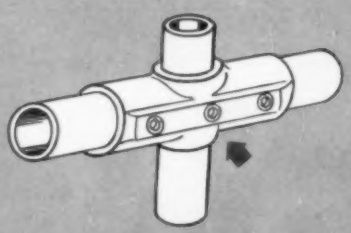
**16D.** This floor flange is a four-hole floor fitting with two set screws to hold the end of the tubular upright. The flange can be attached to the floor, or not, as desired.



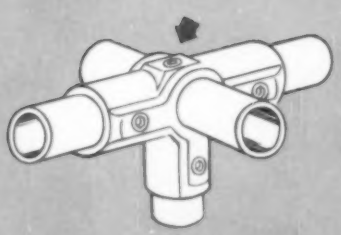
**16E.** T-fitting joins the end of a branch tube to the main tube, with a setscrew to hold each tube.



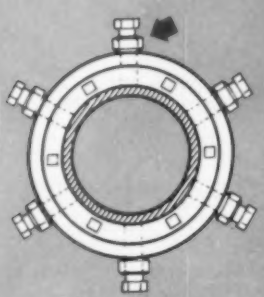
**16F.** T-fitting is similar to Fig. 16E, except that it attaches the ends of two branch tubes to the main tube, the branches at 90° to each other, all securely held with setscrews.



**16G.** Two-socket cross fitting attaches two branch tubes to the main tube, the branches at 180° to each other, all securely held by three setscrews.



**16H.** Side-outlet T-fitting attaches the ends of three branch tubes to the main tube, the branches at 90° to each other, all held by setscrews.



**16I.** Tubular connector is provided with clamp screws set around its circumference near each end, with which to grip the tubing. Setscrews located on the edges of the connector expand gaskets to seal the space between the connector and the tubes. The joint is made by inserting the end of each tube into the connector, tightening the clamp screws against the tubes, then turning the end screws to seal the joint.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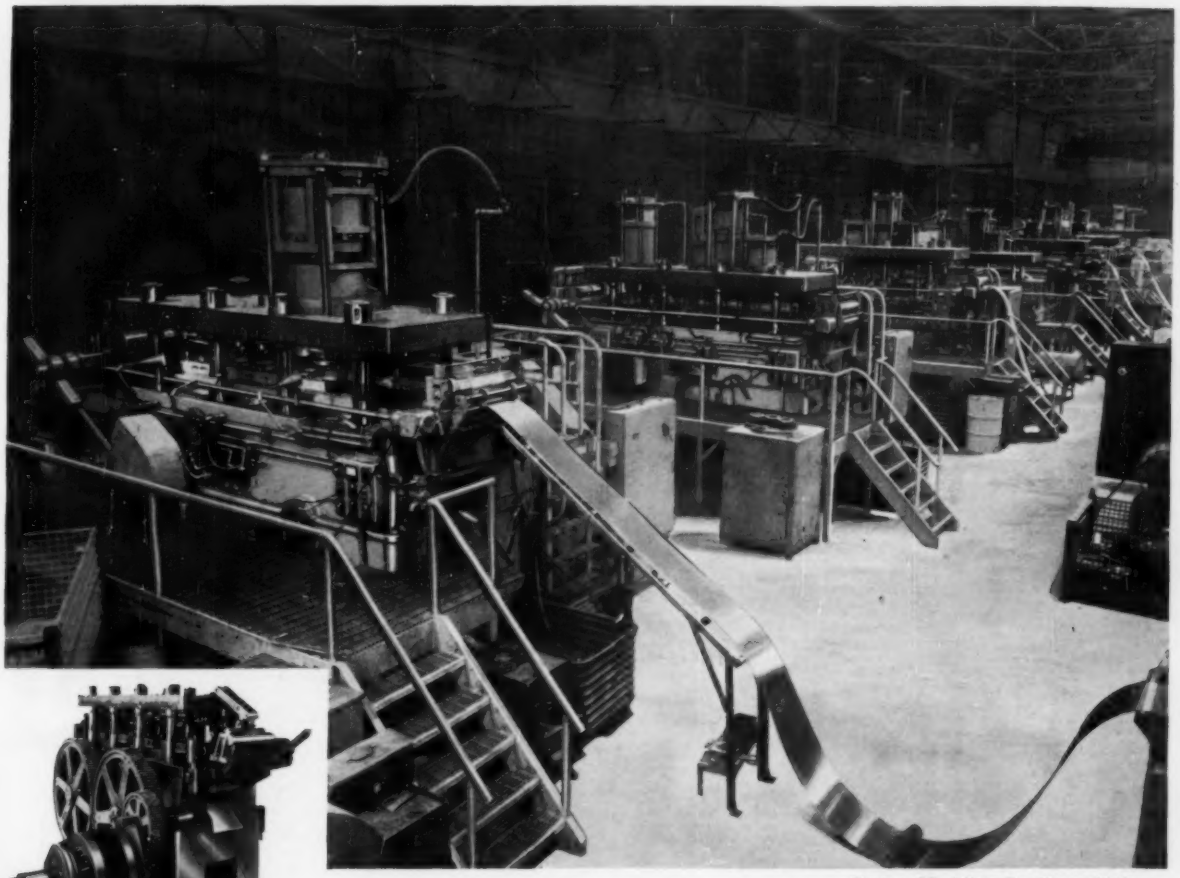
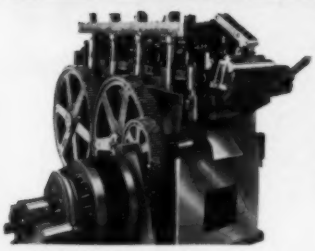
# Seven 300-Ton Brandes Presses at FORD Stamp Huge Runs on 12′ Progressive Dies



Courtesy of Ford Motor Co., Monroe, Michigan



*Rear View of one of the above Brandes 300-Ton Double Crank Presses.*

Illustrated above are Brandes 300-Ton Double Crank Presses at the Ford Stamping Plant, Monroe, Michigan. These presses utilize 9-station, 12-ft. progressive dies to produce headlamp housings, hub caps, ball ring retainers at 24 to 28 strokes per minute. The tremendous length of the dies (*Brandes designed and built the first 12-ft. die*) plus the extreme accuracy of alignment built into the press give phenomenal runs between grinds. The overall height of these Brandes 300-Ton Double Crank Presses is only 9 ft. These presses are *not* installed in pits, giving greater versatility and low cost installation. Designed for versatility and proven in production for over 5 years, the installation at Ford permits continuing stamping economies with only tooling changes for new styles and models. Brandes will build your press and design your tooling to give you the greatest cost savings in progressive die stampings.

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# Design of Precision Sprockets . . I

ARTHUR HILL, chief designer, DACO INSTRUMENT COMPANY, BROOKLYN, N Y

Camera-type sprockets are being adapted to computers. Here are gear-tooth calculations and data for dimensioning and generating a precision sprocket, as normally used in a tracking camera or a computer for the accurate transmission of tape or film.

The sprocket will accommodate standard 70 mm perforated film, manufactured in accordance with Military Standard MS33525 (see Fig. 1). The sprocket has 56 teeth, a roll diameter of 3.3273 in. that will provide a mean diameter to the film (0.006 in. thick) of 3.3333 in.

In the design of this particular sprocket, the teeth are shaped to meet two different conditions: the film can leave the sprocket on a 1-in. dia roller, or the film can be pulled off in a tangential path. These two extremes call respectively for a tooth contour not exceeding an epicycloid or an involute using the roll diameter of the sprocket as a base circle, see Figs. 2*a* and 2*b*.

A tooth radius is chosen coincident with both curves at their base and lying just inside at the tip of the tooth. A radius of 0.280 in. with its center 0.010 in. below the roll diameter is found to be satisfactory. It is now necessary to compute data to design and make a templet that can be used on the Panto-Crush grinder. The templet is used for dressing a wheel to grind the space between the sprocket teeth as shown in Figs. 3 and 4. Note: the computations and process described here are not restricted to any specific kind of gear grinder. In fact, this information can also be used for any kind of a gear hobbing machine by simply making a hob to the same proportion and with the same profile as the grinding wheel shown in Fig. 7. It will be noticed that the tooth fillet radius *R* must originate below the roll diameter, and that the circumference of the wheel may be straight in section, i.e., parallel to the axis of the wheel.

One method of fabricating the sprocket is to make it from a 3-piece sandwich construction utilizing ground aluminum side plates of a diameter equal to the roll diameter. The center plate is made of steel equal in thickness to the sprocket tooth thickness, and hardened and ground from the crushed wheel, Fig. 4. The work piece is indexed 56 times to grind the gear tooth spaces; however this method is extremely time consuming for a production setup.

A better production method was devised as a result of a study conducted to determine if it is practical to grind the sprocket teeth on the Reishauer gear grinder. This method requires dressing the grinding wheel to fabricate a tooth form that would satisfy the conditions as stated above. The tooth now has an involute form instead of only a radius.

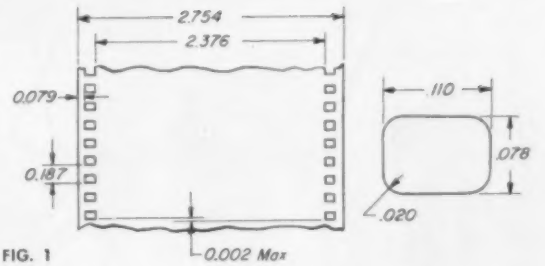


FIG. 1

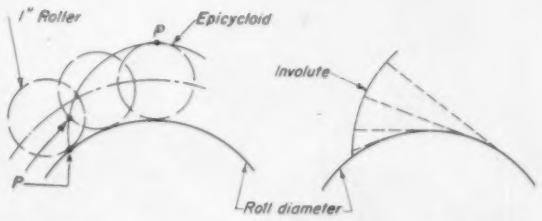


FIG. 2

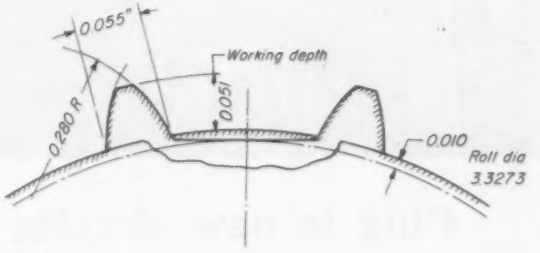


FIG. 3

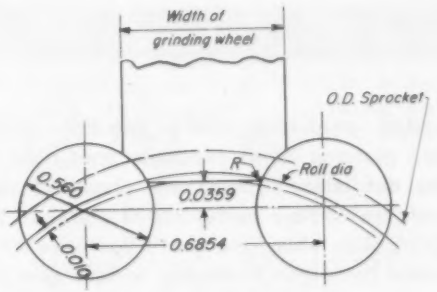


FIG. 4

The first step in this preferred production method is to establish the correct pressure angle for the involute tooth form. As indicated above, the tooth profile must be generated in such a manner that there will not be any interference with the epicycloid or involute take-off.

If the involute has a base circle below the roll



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# Design of Precision Sprockets . . II

diameter of the sprocket the tooth form will clear the perforations in the film while the film is being loaded or unloaded tangent to the roll diameter.

To help determine the correct pressure angle, it is necessary to establish how many degrees of rotation on the sprocket are needed to satisfy an epicycloid profile tooth. This information can be established as follows (See Fig. 5) and these computations:

$R_o$—Outside radii of sprocket teeth, 1.7146 in.

$r$ —Mean radii of the film rolled on 1-in. dia roller, 0.503 in.

$C$ —Center distance between the sprocket and roller with film in between, 2.1697 in.

$R$ —Mean radii of film rolled on roll diameter of sprocket, 1.6667 in.

$$\cos\theta = \frac{r^2 + C^2 - R_o^2}{2\,r\,C}$$

$$\theta = \frac{0.503^2 + 2.1697^2 - 1.7146^2}{2 \times 0.503 \times 2.1697}$$

$$= 0.92567$$

$$\theta = 22.2302°$$

$$\cos\Psi = \frac{1.7146^2 + 2.1697^2 - 0.503^2}{2 \times 2.1697 \times 1.7146}$$

$$= 0.99382$$

$$\Psi = 6.37202°, \text{ or } 0.1112 \text{ radians}$$

Because the roller $r$ rolls on the radius $R$ and does not slip, they both roll off an equal amount of their circumference. Therefore, their arcs AB and BD are equal. Employing the theorem—radius multiplied by the included angle expressed in radians equals the length of arc in the included angle; then because the two arcs are equal to each other, their equations are also equal to each other.

$$\frac{\theta\,\pi}{180} \times r = \frac{\delta\,\pi}{180} R$$

$$\therefore \delta = \frac{\theta\,\pi\,r}{180} \times \frac{180}{R\,\pi} = \frac{\theta\,r}{R}$$

$$\delta = \frac{22.2301 \times 0.503}{1.667}$$

$$= 6.709°, \text{ or } 0.1171 \text{ radians}$$

$$\phi_E = \delta - \Psi = 0.0059 \text{ radians}$$

It is important to make certain that the pressure angle of the teeth at the outside diameter of the sprocket when generated is an involute greater than 14°47′, which would be the pressure angle of an involute tooth whose involute function is equal to $\phi_E$. Because the pitch diameter of the gear in the following computations is just about equal to the outside diameter of the sprocket, a pressure angle of 15° 3½′ is selected because the base circle for this gear would then fall approximately 0.011 in. below the roll diameter. Furthermore, by providing a minimum radius of 0.004 in. on the wheel, the sprocket tooth will not be undercut.

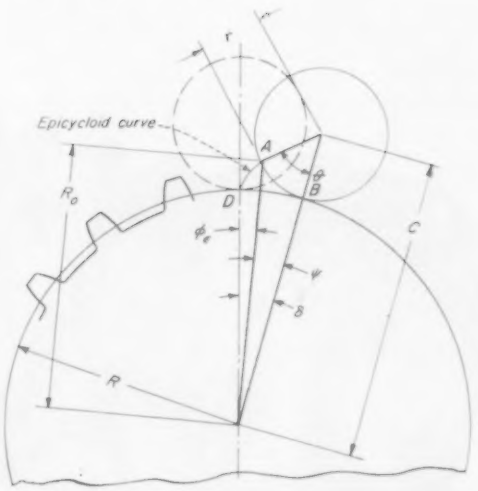


FIG. 5

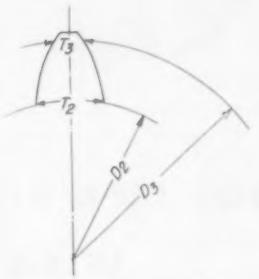


FIG. 6

This data is now converted into information similar to gear calculations in order to setup the Reishauer gear grinder, or any other gear-generating machine tool. From the Reishauer manual PZA 75 a gear train can be setup as follows:

$$\frac{12}{DP} = \frac{G_1}{G_2} \times \frac{G_3}{G_4}$$

From the selection of change gears a 16 1/3 DP is easily obtained.

$$\frac{12}{DP} = \frac{40}{70} \times \frac{54}{42}$$

$$\therefore DP = 16\ 1/3$$

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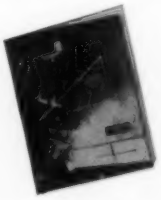

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# Design of Precision Sprockets . . III

Computing the imaginary gear

| | | |
|---|---|---|
| No. of teeth | $N$ | $= 56$ |
| Diametral Pitch | $P$ | $= 16\ 1/3$ |
| Pressure angle | $\phi_2$ | $= 15^\circ\ 3\frac{1}{2}'$ |
| Pitch diameter | $D_3$ | $= 3.4286$ |
| Circular pitch | $C$ | $= \frac{\pi}{P} = 0.1923$ |
| Outside diameter | OD | $= \frac{N+2}{P} = 3.5510$ |
| Whole depth | $D$ | $= \frac{2.156}{P} = 0.132$ |
| Root diameter | R D | $= 3.2870$ |

$$D_3 = \frac{N}{P} = 3.4286$$

Base dia. $= 0.9915 \times 3.3333 = 3.3048$

Referring to Fig. 3, the sprocket tooth shows a height of 0.051 in. and an undercut of 0.10 in. below roll diameter. Therefore, the wheel will penetrate 0.061 in. below the outside diameter of the sprocket. Also note that the tooth has a chordal thickness of 0.055 in. at the roll diameter. The arc tooth thickness is 0.055 in. at the point of contact with the mean thickness of the film. However, for the purpose of dimensioning the grinding wheel the arc tooth thickness must be determined at the pitch diameter of the imaginary gear.

$T_2$ = Arc tooth thickness of tooth at $D_2 = 0.055$
$T_3$ = Arc tooth thickness of tooth at $D_3$
$\phi_1$ = Pressure angle at point where the mean diameter of the film makes contact with the tooth
$D_2$ = mean dia of film = 3.3333
$D_3$ = pitch dia = 3.4286

$$\text{Cos } \phi_2 = 15^\circ\ 3\tfrac{1}{2}' = 0.9639$$

$$\text{Cos } \phi_1 = \frac{D_3 \text{ Cos } \phi_2}{D_2} = \frac{3.4286 \times 0.9639}{3.3333} = 0.99145$$

$$\phi_1 = 7^\circ 30'$$

$$\text{Inv } \phi_1 = 0.00075 \quad \text{Inv } \phi_2 = 0.00622$$

$$T_3 = D_3\left[\frac{T_2}{D_2} \times \text{Inv } \phi_1 - \text{Inv } \phi_2\right]$$

$$T_3 = 3.4286\left[\frac{0.055}{3.3333} + 0.00075 - 0.00622\right] = 0.0343$$

The root diameter of the sprocket is equal to the roll diameter minus 0.020 in. as indicated in Fig. 3, or 3.3073 in. This figure is 0.1213 in. less than the pitch dia of the imaginary gear. Therefore, to determine the dimension for the width of the groove in the grinding wheel at the point of deepest penetration, Fig. 7, multiply 0.1213 in. by the tangent of $\phi_2$ and add this value to $T_3$.

ie: $0.26904 \times 0.1213 + 0.0343 = 0.067$ in.

From this information the grinding wheel can now be dimensioned.

It should be noted that the dimensions given in Fig. 7 are normal to the tooth and not parallel to axis of wheel.

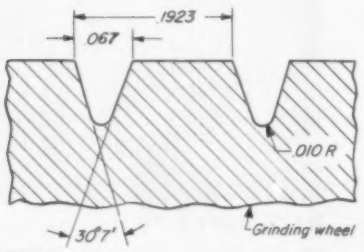



FIG. 7

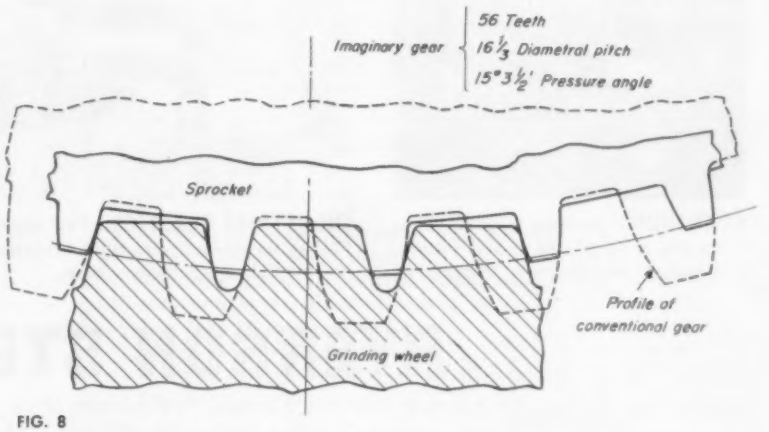



FIG. 8

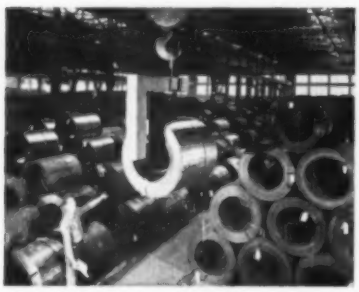
# REPORT FROM RYERSON
## on Services and Products in Stock

In addition to the products shown below, you can call on Ryerson for flame-cut steel shapes, fabricated steel for reinforced concrete or steel frame construction—many other products and services. And equally important are the specialists who carry out the Ryerson quality control program —see that customers specifications are *exactly* met, that every order is correctly filled and promptly delivered. As a result you get unequalled service and certified quality when your company calls Ryerson for steel, aluminum, industrial plastics and machinery.

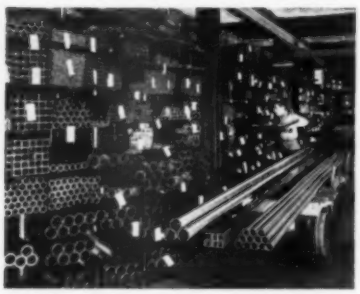
**CARBON STEEL & ALLOY BARS** Most complete range of types, shapes and sizes as well as largest tonnage.

**STRUCTURALS**—I-beams, H-beams, channels, angles, tees and zees—all high quality steel to ASTM spec. A-7.

**PLATES**—14 types including special low carbon steel plates for forming and welding, leaded New E-Z-Cut, etc.

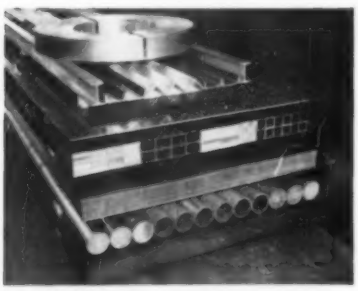


**SHEET STEEL & STRIP**—More than 20 different types in pattern sizes, cut-to-order sizes, strip coils, etc.



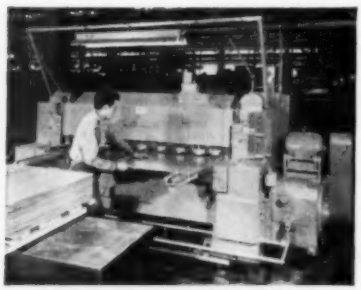
**TUBING**—Seamless and welded steel tubing—mechanical tubing, fluid line, pump cylinder and structural tubing.

**STAINLESS STEEL**—Allegheny stainless in over 2,221 sizes, shapes, types, finishes: sheets, plates, bars, pipe, etc.



**ALUMINUM**—At many Ryerson plants —sheets, coils, plates, bars, tubing, architectural and structural shapes, etc.

**INDUSTRIAL PLASTICS**—PVC pipe, fittings, sheets and rods, rigid Kralastic and flexible polyethylene pipe.



**MACHINERY & TOOLS**—The broadest line of metal-working equipment available from a single source.

# RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

# Talking Shop...

### Did You Say Twilt?

IF YOU'VE BEEN disturbed by some of the new words engineers have coined in recent years, wait until you hear someone say "Twilt." This one originated at Northrop to describe the motion of the cutting head which can twist or tilt to any angle during operation. The heads are planned for use on a Kearney & Trecker tape-controlled machine now being installed at Northrop.

### Hardness Problem

A GOOD EXAMPLE of the danger in over simplifying the choice of specifications is provided by Lew Suverkrop. A large consumer of small, pointed, expendable parts subject to severe impact and abrasion chose a hardness figure as an essential part of the specification. The figure chosen was based on tests of a number of parts that had proven unusually durable in service.

Unfortunately, the size and shape of the part made it difficult to determine hardness accurately in the machine chosen. If the part were actually as hard as indicated, brittleness would prevent getting the service file required. Samples made from the same stock as the first batch, and with the same heat treatment, failed to pass the hardness test in the user's laboratory on the same testing machine. The hardness specification was revised several times but without any success in getting reasonable bids.

Finally, a consultant substituted a specification calling for a simple drop test that would directly indicate impact resistance and was easily correlated with resistance to abrasion—the qualities really required in the part.

### New Missile

THERE IS A STORY going around that we now have three major types of missiles: IRBM, ICBM, and IOBM. You are familiar with the Intermediate Range and Inter-Continental Missiles, we are sure. The third is said to be titled the "Into the Ocean By Mistake."

### Well, Is There?

MANY THOUGHTFUL people have been disturbed over the shortage of engineers. There has been a rising tide of words focused on this problem by educators, employers, and engineering societies. Judging by the classified advertising volume, and other indicators, the shortage has eased in recent months. Right at this time, the National Bureau of Economic Research has published a book asserting that "there is no evidence of a shortage of engineers." We hardly think the book will confuse people who, despite the *slight* easing in demand because of defense cutbacks, find that the engineer is still extremely scarce. But you may find that it confuses some people not so close to the problem. The answer is not a simple one, but basically the "proof" that there is no shortage seems to rest on statistics that are several years old. Despite short-run changes in demand, industry will need more engineers for years to come and all of us concerned with the problem must guard against misleading reports that might discourage young men from entering engineering schools.

### Rivet Drill

A MACHINIST at Convair-Ft Worth has won $2768 (a record for the plant) for a suggestion. Joe Rozina describes his idea as "a little contraption to drill rivets." It is a device consisting of a chute and bushing to feed an automatic screw machine and eject the drilled rivet that is four or five times faster than doing it manually.

### Careless Carlos

THOSE GREMLINS that infested the cockpits of military aircraft during World War II have cousins we have all encountered. A friend of ours at Wesson Co thinks he has discovered the particular cousin that infests carbide tool operations. A series of shop posters show a dozen ways you can use "to get the least out of carbides." We'll bet you know them all, but once in a while you might forget one of them.

### It's Possible

MOST OF THE STORIES you hear from Washington seem to deal with examples of waste or red tape. In contrast, one of our correspondents there reports that when the Food and Drug Administration decided to retire some 50-year old laboratory scales, regulations required that they be advertised first to other agencies, then to the general public. The advertising brought one bid—from the Smithsonian Institution. The scales are now on display there.

---

### Automation

***A hundred feet long it's complex and complete***
***It stretches clear out of view***
***What with grinding and milling, boring and drilling***
***There's nothing this machine couldn't do.***
***Although building a tool so versatile***
***Is quite an outstanding caper***
***Remember the hand that aligns this machine***
***Is the hand that pushes a scraper***

—ERNIE BEIN

# Air Primes and Subs Cringe as

**WASHINGTON — Defense cutback decisions continue to flow from the Pentagon under the administration's drive to sweat out over $2 billion from military expenditures this year, to thus stay close to the $38-billion cost estimate fixed in the January military budget.**

In recent weeks:

• The Navy stretched out production schedules for the Chance Vought F8U-1 Crusader fighters, the Douglas F4D-1 Skyray fighter, the Douglas A4D-2 Skyhawk attack bomber, and the McDonnell F3H-2 Demon fighter. It also dropped plans to build a guided missile frigate and to convert an existing ship into a seaplane tender for jet flying boats.

### Eastern Firms Hit

• The Air Force cancelled Republic Aviation Corp's six-year, $100-million project to develop the F-103 high-performance, all-weather interceptor aircraft and Curtiss-Wright Corp's companion project to build the J-67 ramjet engine to power the plane. It also dropped its contract with United Aircraft Corp's Pratt & Whitney Division to build a prototype reactor for a nuclear bomber and is considering plans to slowdown Lockheed Aircraft Corp's development of the airframe.

### Army Stretchouts, Too

• The Army made the first of what is likely to be a series of production stretchouts—U S Hoffman Machinery Corp's $22.6-million contract to produce 8-in. shell casings. It also disdisclosed plans to lay off 15,000 civilian employees and to shut down 16 bases, depots, and plants.

Pentagon officials estimate that some 100,000 aircraft industry workers will be laid off this year as a result of over-all reductions in defense production.

Retiring Defense Secretary Wilson says the squeeze on fiscal 1958 military spending has been "fairly well mapped out now." But while this big round of defense cuts is nearly over, the Defense Dept is starting out on what in effect is a second round of economy measures—to be reflected in new contract awards and expenditures for fiscal 1959 starting next July 1.

This will consist of new decisions to cancel overlapping development projects (such as the Air Force Thor and Army Jupiter IRBM programs), stretchout certain weapons production even more, and postpone volume production of items still in development—all aimed to hold next year's defense appropriation request close to the $38.5-billion sum in the administration's last budget.

### Hoo-Haw in Washington

Meantime, the impact of the defense cuts is being felt in Washington circles:

• The Senate Small Business Committee (see p177) has started investigating the effect of reduced aircraft production on small subcontractors. At issue is the Committee's fear that bigger prime contractors will now pull back to their own plants production normally farmed out to smaller firms.

• There is growing Congressional

# Settle West Coast Strike-Lockout

**SAN FRANCISCO—The 8000 members of the International Association of Machinists, who idled 135 San Francisco area machine shops and production plants, are back to work after a six weeks strike-lockout. The end came March 15 when eight IAM lodges reached an agreement with the California Metal Trades Association after a long and bitter fight, during which the Association's member companies locked out all IAM members on grounds that "a strike against one CMTA plant is a strike against all."**

The new pact, which makes the San Francisco machinists the highest paid on the Pacific Coast, calls for wage boosts this year ranging from 13¢ to 20¢ an hour—with an across-the-board wage hike of 11¢ slated for next year. The new hourly rates, effective retroactively to August 15, are:

• Tool and diemakers, $3.15 (up 20¢).

• Maintenance machinists $2.82 (18¢).

• Journeyman machinists $2.67 (17¢).

• Specialists $2.35 (15¢).

• Male production workers $2.16 (14¢).

• Female production workers $2 (13¢).

### Sick Leave Issue Bypassed

Paid sick leave, an issue that became a major stumbling block in negotiations, was not included in the contract, but written into the contract was an escalator clause that ties worker wage rates to the Consumer Price Index. This had been a feature of previous contracts, but not the one just expired.

Two additional half-day holidays —before Christmas and New Year's —were written into the contract. And workers will get a three-week vacation after 12 years' service instead of 15 years.

Originally, the union had asked for pay raises averaging about 10% and ranging from 25¢ to 55¢ an hour. The employers offered 6¢.

Other West Coast developments:

• A Pacific Coast shipyard tie-up was averted when 1100 machinists agreed to a master contract accepted earlier by 11 other shipbuilding unions. The seven-lodge IAM group had threatened to strike—not because they objected to the settled-upon 15¢ hourly wage hike, but because they wanted two additional holidays. Shipyards from San Francisco to Bremerton, Wash, are included in the agreement.

• The Blacksmiths' Union continued to picket San Francisco Bay area forging plants to enforce demands for a 15¢ across-the-board hourly wage hike. The California Metal Trades Association is offering increases ranging from 9¢ for assembly workers to 15¢ for mechanics. Local 1168, a blacksmiths unit affiliated with the International Brotherhood of Boilermakers, AFL-CIO, is involved.

• Two other groups bargaining with CMTA, the CIO Machinists and the Ironworkers, are on strike, too.

# Pentagon Deals More Cutback Blows

Democratic criticism of the administration's policy to trim defense spending. Charges have been made that the defense cuts undermine the U S bargaining position in arms control negotiations with the Russians and endanger the national security of this country.

### "The Old, Cracked Victrola Record"

Though the Pentagon claims it has heard few if any reports of small military subcontractors losing business to primes under the current economy drive, the Senate Small Business Committee is rushing in for a look.

When asked to comment on the problem, Wilson said recently: "I don't know how much of it there is. It sounds like an old cracked Victrola record to me. I have heard it before through the years."

The matter of how much work prime military contractors are required to farm out to subcontractors is a fuzzy one. The small business act, under which SBA is set up, specifies the Agency's task to be one of assuring a "fair share" of government business to small firms. Military subcontracting has traditionally been the major source of government business for such companies.

Prime military contracts do not specify the exact amount of business to be subcontracted, but the larger contracts—for airframes, engines, and the like—almost always have a clause calling for a "maximum amount" of subcontracting.

Ordinarily, while the contract is being negotiated, the prime contractor reaches an understanding with procurement officials that a certain amount of the contract dollars will be subcontracted to other companies. If the prime wants to reduce the volume subcontracted, he needs the Services' approval.

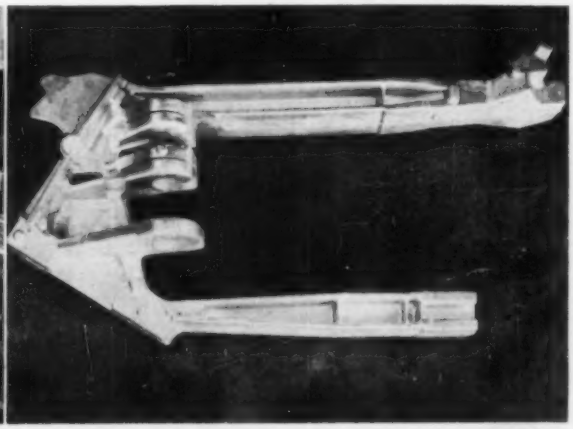
### 55% of Engines Subbed

The Air Force says that on engine procurement, an average of about 55% of the dollars are subcontracted, on airframe, almost 30%. On missile projects like the Air Force's Boeing Bomarc, as much as 70% of the contract's dollar value is reportedly farmed out to subcontractors. In the case of Bomarc, a leading subcontractor, however, is a giant like Westinghouse.

"We haven't heard of anything significant yet about big primes pulling work back from subs," a top-level Air Force official tells *American Machinist*. "But we're sure they're looking the situation over. If things get so bad that the primes get really down on their work load, you can't blame them for wanting to pull back orders. But we haven't reached this point yet."

### Big Ones Are Hit, Too

But even big subcontractors are hurting. Under the recent stretchout in Boeing's B-52 output, for example, the company set plans to put all its production in its Wichita, Kansas, plant and halt B-52 work at Seattle, Wash. In the process, it dropped one of its two engine nacelle suppliers, Bell Aircraft. Rohr Aircraft Corp will remain as the sole nacelle subcontractor.

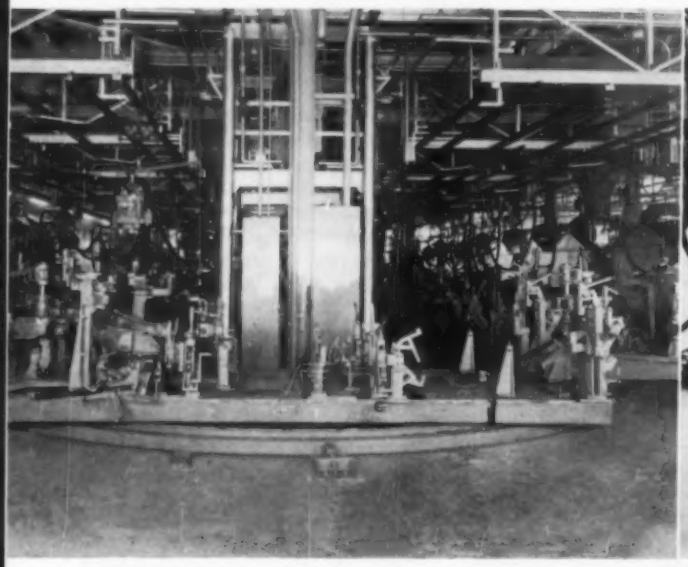


**From machining off 415 lbs from a 645-lb forging . . .** **. . . to a 289-lb forging that needs very little machining**

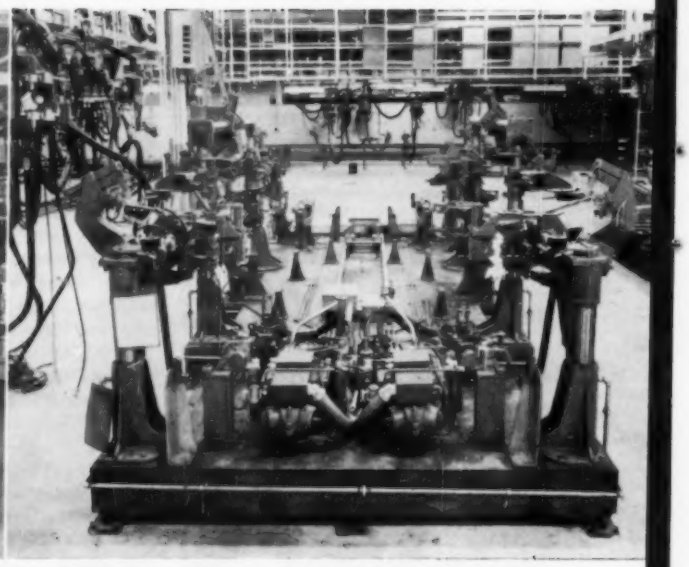
## 50,000-Ton AF Press Slashes B-52 Machining Costs

The huge (50,000-ton) Air Force heavy press at Aluminum Co of America's Cleveland Works is cutting sharply into production costs for the Boeing B-52 Stratofortress. The press is producing aluminum landing gear bulkheads that require only 38% as much machining time as did former methods. Use of the press is the third evolutionary step in an effort to cut machining costs.

First, in 1954, forged aluminum parts replaced complex weldments, but in the case of the landing gear trunnion 1300 lbs of aluminum had to be machined out of a 1625-lb contoured forging. Then (second) the 1625-lb forging was replaced by an 875-lb blocker-type die forging—but 645 lbs of metal still had to be machined off (photo above left.) Today (third) the 50,000-ton press precision forges the same part to such a degree that the part leaves the press weighing only 289 lbs—67% less than the die forging

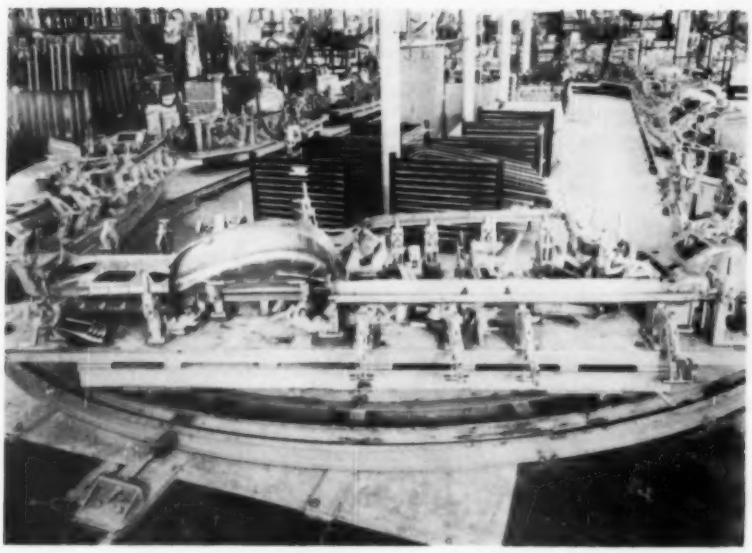


**Underbody assembly fixture . . .**
This is the fixture upon which the underbody is built—and 1250 spotwelds are required in this operation alone. Body then moves onto conveyor for the next step—attachment of the car's body sides



**Framing body buck . . .**
Here 586 spot welds join the entire body together. At a rate of 30 units an hour, the welds are completed in 12 minutes by a six-man crew. This one-stage operation is unique, says Lincoln—other plants make the welds in two stages

# Lincoln Opens Its Unitized Body



**Merry-go-round assembly . . .**
Body side assembly carousel can turn out 30 right side and 30 left side units per hour. A total of 1730 spotwelds are performed in this operation by a crew of 27 spot welders. Sides are taken from the carousel, attached to underbody floor pan with toggle clamps. From here, assembly moves on to the framing body buck

**WIXON, MICH — Opening of Lincoln's new 1.3-million-sq-ft assembly plant here late in August marked the final separation of Lincoln from Mercury production, and Lincoln's jump into unitized body construction. Now in full production of 1958 models, the plant can turn out 112,000 cars a year, employs 5000 people at peak periods.**

Automation is limited because of Lincoln's desire to achieve a high degree of flexibility. For instance, instead of using special multiple spotwelding equipment, Lincoln makes its 3300 spotwelds per car with single standard guns.

Six overhead monorail conveyors are used in the chassis line as axles, suspensions, shocks, driveshafts and other parts are connected to the unitized frame from underneath. Each of these 140-ft-long lines holds nine bodies. An engine dress-up conveyor feeds the chassis line, where the engine is decked and the instrument panel, radiator assembly and tires and wheels are added.

Trim department has two dual-chain pre-trim conveyors, and seven for a pre-trim bank. All inside hard-

# Accuse Pentagon of "Big Business" Bias

WASHINGTON—Pentagon procurement policies and practices—including unit weapons-system buying—have cut small suppliers' share of the defense spending pie to a new low of 3½% for the first half of fiscal year 1957, threatening little business with a storm which it may not weather. If small suppliers "go under," the potential damage to a broad mobilization base "is patently dangerous to the strategic defense and economic well-being" of the United States.

### A Familiar Theme

With this strong conclusion, a new report of the Senate Small Business Committee strikes a fortissimo note on a familiar theme. The Senate group, headed by Chairman John Sparkman (D-Ala), has harped long and hard on small business complaints about Pentagon buying. This time, the Committee singled out three specific areas of Air Force procurement for sharply critical case studies based on hearings last spring. The report deals with:

- The administration of the weapons-system concept of procurement;
- The testing procedures used in buying items on the so-called Qualified Products List;
- The weighted average pricing formula for determining small contractor's price for jet fuel.

Problems arising under the weapons-system procurement philosophy were dealt with at great length by the Committee. The report is more moderate in its criticism of the Pentagon's position in respect to this procedure than in the other two practices cited.

### Too Little for the Subs?

Small subcontractors told the Committee that the Pentagon, particularly the Air Force, has come to rely heavily on large prime contractors for its planes and missiles, and that it has placed the management responsibility for over-all development and supply of component parts in the hands of these large airframe makers. The complaint is that these suppliers tend to manufacture as many of the components as possible, expanding their own facilities in some cases to do this, often with government assistance through fast tax writeoffs.

### AF Outlines Policy

The Air Force told the Committee it must rely on complete unit weapons-system procurement, but has a firm policy of insisting on large contractors farming out as much work as possible to small companies.

The report concludes that "there is an undeniable need for the weapons-system method of procurement for certain types of highly technical and complex items," but that the Pentagon has "circumvented" both the spirit and letter of several laws that are intended to protect small subcontractors.

It recommends that the government stop helping prime contractors to expand their facilities to make component parts that could be farmed out, including as a prerequisite for any tax help a finding that there are no small business facilities available in any given area before writeoffs are granted.

The report also recommends that the Pentagon keep closer tabs on prime contractors to make sure they sub-let as much component manufacturing work as possible.

### Testing Too Expensive

Small contractors' complaints about Qualified Products List procedures center around the argument that the testing required is often too expensive for a small contractor to handle, particularly when there's no assurance he will get the contract. The Committee cited a specific case wherein the Air Force invited bids from more than 100 companies for power-supply units, when many of the companies obviously could not economically meet the requirements.

### Complaints Galore

The Committee also peppered its report with examples of delay, cases where the Air Force negotiated bids instead of advertising them, and other instances wherein buying practices allegedly worked to the disadvantage of small contractors. The report also noted a recent court ruling that contractors bidding on items on the secret Qualified Products List may legally sue the government for testing costs when the buying agency has no intention of considering the bids. This, the Committee charged, is a patent waste of the U S taxpayers' money.

### Weighted Average Formula

The weighted average formula determines an average bid price for contracts filed under the portion of defense procurement specifically set aside for small business, based on average prices of larger suppliers. This average, the Committee charges, is often too low. The report says that defense officials have agreed, and have promised to use a new formula for small contractors' prices, based on the highest bid submitted by the larger contractors.

# Plant

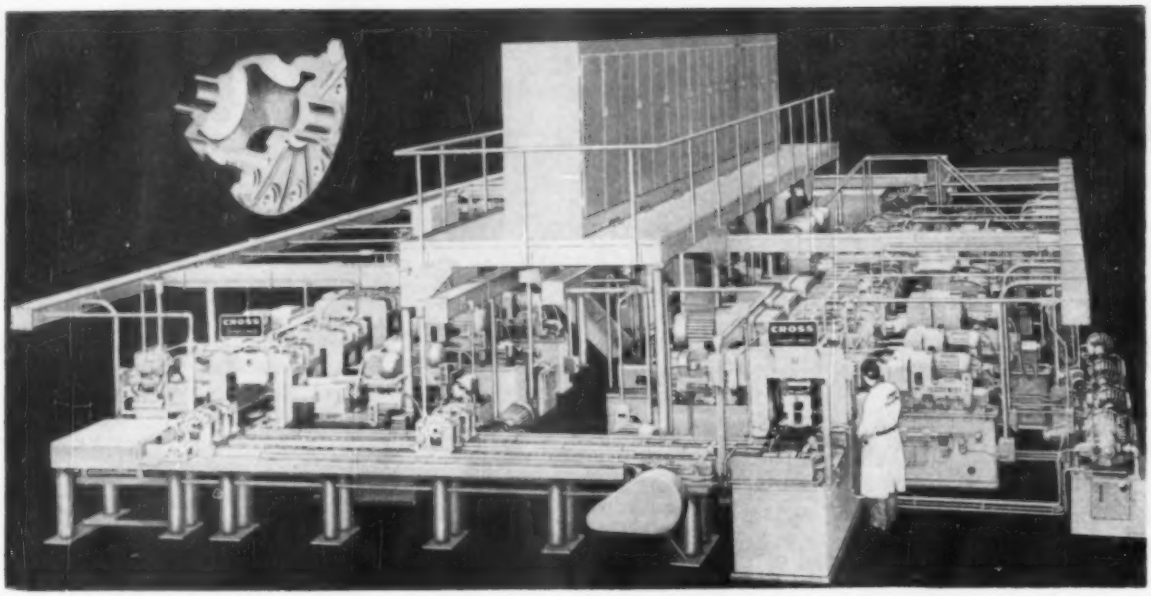
ware, body trim, moldings and similar parts are installed in this department.

Underbody, floor pan and front end assemblies are welded together on a merry-go-round unit, after which they are transferred to the body buck area. Simultaneously, body sides are assembled on another merry-go-round fixture, and fed into the buck area. The major components—underbody, sides and roof—are clamped together on the delivery conveyor so they can be removed as a unit and placed in one of six body bucks for spotwelding.

The Wixon plant has 41 powered materials handling units—19 of them fork trucks and tow tractors that operate on liquefied propane gas. Only air tools are employed for assembly work. Including spares, the plant has 1200 pneumatic tools—suspended from balancers or tool rails wherever possible.

To give the unitized underbody rust protection, the entire body unit is carried by powered overhead conveyor into a prime dip tank and submerged. From there, it goes into a drain and wash-off area.

# FIELD REPORT



**A first for the auto industry . . .**
First of its kind in the automobile industry, this Cross Transfer-Matic machines and inspects one-piece rear axle differential gear cases for a major automotive manufacturer. The machine, which also performs difficult inside-the-part machining operations formerly done by single-station units, does two parts at a time. It rough and finish forms the two spherical pinion seats simultaneously; roughs and finish bores and faces the two seats for the side gears; drills, bores and reams the pinion shaft hole, drills and reams the lock pin hole; and drills, chamfers, spotfaces and reams 12 ring gear mounting holes—all at a rate of 212 pieces per hour at 100% efficiency. Insert shows cutaway view of gear case machined surfaces

## Midwest...

**General Electric Co's** Cincinnati plant has a $8.9-million order from the **Convair Division** of **General Dynamics Corp** to turn out jet engine thrust reversers for the Convair 880 jet airliner . . . **Harley-Davidson Motor Co**, Milwaukee motorcycle manufacturer, in addition to moving to Butler, Wis, is adding a motor scooter to its '59 line . . . **Westinghouse** is recalling 500 workers at its Mansfield, Ohio, plant because of "noticeable pickup in the appliance lines." About 1000 were laid off early this year . . . **Napco Industries, Inc,** Minneapolis, has a $10-million contract from **Utica-Bend Corp (Curtiss-Wright** subsidiary) to make axles for 5000 six-wheel-drive trucks. First delivery is for December . . . **International Harvester** has two defense contracts (over $10 million) to make crawler tractors with equipment . . . **Automotive Gear Division** of **Eaton Manufacturing Co** is starting a $2-million expansion program that'll increase manufacturing space at its Richmond, Ind, plant by 50%. . . . **Allis-Chalmers'** new $3.25-million engineering and research lab at its Harvey, Ill, Works, scheduled for completion next spring, will include an engine test wing accommodating 32 engine dynamometers . . . **M A Ford Mfg Co** has tripled its plant and office facilities at Davenport, Iowa. Full production of cutting tools was under way two weeks ago at the new address, 1545 Rockingham Rd . . . **Link-Belt Co's** new $5-million bearing plant in Indianapolis, to be completed next year, will increase capacity of the present Dodge bearing plant by 50%; full production will be in swing by 1959 . . . **Chicago Aerial Industries, Inc,** has set up a components division. Initial production will concentrate on potentiometers, and new setup will move from company's Melrose Park plant to new quarters in Franklin Park, Ill . . . **American Motors** and the UAW have set up a system to help laid-off workers to get supplementary unemployment benefits. New plan, which goes into effect Sept 16 on a trial basis, lets worker mail his application for SUB payments to the company, (eliminating dual reporting) after receiving his state unemployment benefit. American Motors is the first auto manufacturer (**Doehler Jarvis** started it a few weeks ago) to put the system into effect . . . **Gardner-Denver** has about completed its half-million-dollar expansion of foundry facilities at the Quincy, Ill, plant . . . **Flick-Reedy** is installing a $500,000 heat pump in its $2.3-million plant being built near Chicago. It'll heat the plant in winter, cool all 220,000 sq ft of office and factory areas in summer. Unit is largest installation of its kind in the country to use air as its source of heat.

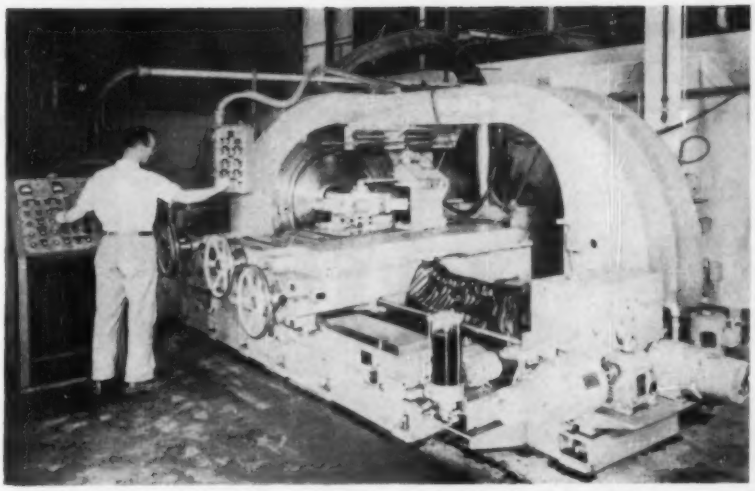
## West...

Regular assembly operations start this month at **Mercury Division** of **Ford Motor Co's** new multi-million-dollar plant in Rivera, Calif. The 30 acres of building floor space (double the capacity of the Maywood, Calif, factory) will take on 1700 employees from the Maywood plant, and another 400 assembly workers will be added to the force to turn out 1958 Mercurys and Edsels. Maywood site plans are indefinite as of now . . . Facilities for making jet engine starting equipment and other ground power support units are being put up in a 110,000-sq-ft plant for the **Inet**

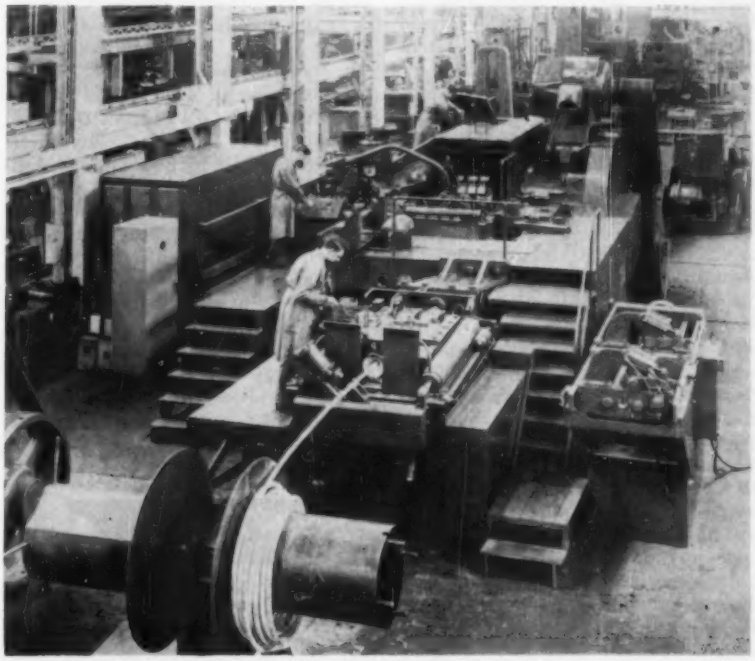
**Division** of **Leach Corp.** Company is supplier of 400-cycle equipment for checking out radar and other systems of jets prior to flight, and for checking function of missile systems before firing . . . **Lightcraft of California's** new $1-million plant in Los Angeles goes into operation this month . . . **Telecomputing Corp,** N Hollywood, Calif, has merged with **Wm R Whittaker Co, Ltd.** Former makes electro data computing equipment, gyroscopes, and electronic components for missiles, **Whittaker** designs and manufactures aircraft and missile valves and control devices. Combination makes **Telecomputing** a $32-million corporation . . . **Los Angeles Division** of **Boeing Aircraft's** Wichita plant will fabricate tooling for wing leading-edge assemblies of B-52 strategic bombers . . . **Packard Bell** has set up a missile equipment section in its new 21,000-sq-ft facility in Santa Monica. Additional contracts for design, development, and manufacture of ground test and launching equipment for the **Douglas** Thor IRBM made expansion essential. **Packard-Bell Electronics** has already designed and turned out 40 different types of Thor equipment . . . **Marquardt Aircraft** has a $12-million order from the Air Force for production of additional supersonic ramjet engines at its Ogden, Utah, plant.

## East...

**Utica Drop Forge & Tool Co** has laid off 100 workers, expects to drop 300 more by late fall because of Air Force trimming of orders for jet engine blades . . . And **US Hoffman Machinery Corp** is cutting its Scranton ordnance plant work force from 1500 to 500 during the next two and a half months. Company's $22-million contract for production of 8-in. high explosive shells will be stretched out an additional 18 months . . . **Grumman Aircraft,** Long Island, NY, will get a Navy order for production of F-9F-8T Cougar jet trainers; number of planes and dollar figure undisclosed . . . **Atlantic Instrument Corp,** Norwood, Mass, has been taken over by **American Electronics, Inc,** of Los Angeles. Company which makes electronic instruments and components will be operated as a subsidiary . . . **Bell Aircraft Corp,** Buffalo, has called 300 employees back to work, will need another 200 because of a "model change in a sub-

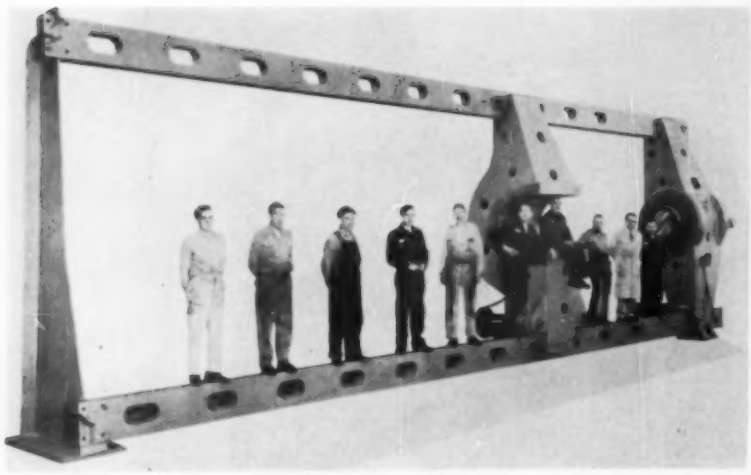


**Automatic center drive lathe machines jet turbine wheels . . .** Expected to meet tolerances of ±0.0005 in., with normal operating speeds of 100 to 250 fpm and a maximum spindle speed of 140 rpm, this Wickes lathe is equipped with GE two-dimensional electronic tracer controls that allow the lathe to machine both sides of a turbine wheel simultaneously while cutting web thicknesses as low as 0.030 in. The 360-degree profile tracer control equipment can follow any templet configuration, make right angle cuts, and reverse itself. The lathe takes workpieces up to 44 in. dia



**Breaking through the bolt "size barrier" . . .** is the largest automatic cold-forging machine ever built—a $500,000 Boltmaker that produces 1¼-in.-dia hexagon head screws at a rate of 40 per minute. This, says Cleveland Cap Screw, marks the first time that cold steel forgings larger than ¾ in. dia have been made by automatic methods. The machine, five years in the making, is designed to make large diameter cap screws and industrial fasteners, and it turns out hexagon head cap screws, hexagon and square-head bolts and structural bolts in sizes from ⅞ in. to 1¼ in. dia x 10 in. long. Ultimately, the machine may turn out odd-shaped components larger than any heretofore produced by automatic cold forging

# FIELD REPORT



**King-sized inclined forcing press . . .**
engineered and built by American Steel Foundries' Elmes Engineering Division is so big that 10 workmen can stand inside its framework—with plenty of room for each "to swing a cat." The two-bar forcing press, designed to force large wheels and drums on and off shafts, is 40 ft long, 15 ft high, has a pressure capacity of 1000 tons

contract project." Bell's principal subcontracts involve building of jet engine housings for B-52s . . . **Harsco Corp,** (formerly **Harrisburg Steel Corp**) Harrisburg, Penna, maker of seamless steel gas cylinders and nonferrous die castings, has acquired the **Ainsworth Manufacturing Corp** through stock exchange, and purchased **Standard Die Set Manufacturers, Inc,** and its subsidiaries . . . New company specializing in ultrasonic cleaning machines and metalworking equipment expects to be in operation in Mineola, LI, by mid-September. Firm will be headed by Paul Martin Platzman who recently resigned as vice president of **Acoustica Associates** . . . **Baldwin-Lima-Hamilton's Eddystone** (Penna) **Division** will make six large propellers for **Newport News Shipbuilding & Dry Dock Co.** The 24-ft-dia props will be fitted on tankers being built for **Barracuda Tanker Co,** a subsidiary of **Union Oil Co** of California . . . **Bossert Division** of **Rockwell Spring & Axle Co,** New Castle, Penna, is laying off 20% of its 500-man work force until auto industry starts production of 1958 models . . . **Columbia Steel Equipment Co,** subsidiary of **Standard Pressed Steel,** is building a 53,000-sq-ft addition to its steel office furniture plant at Fort Washington, Penna . . . New Sendzimir mill and supporting equipment recently installed at **Eastern Stainless Steel Corp's** Baltimore plant is set to go into full production. Expected to increase annual capacity by approximately 50% in terms of dollar volume, mill produces stainless sheet up to 48 in. wide; it'll have total capacity of 4000 tons a month . . . **US Gasket Co's Plastics Division** of the **Garlock Packing Co** has started producing at its new nylon-teflon extrusion plant in Camden, NJ . . . **Automatic Timing & Controls, Inc,** has transferred operations from Philadelphia to its new 74,000-sq-ft plant at King of Prussia, Penna. Production facilities are doubled . . . **Potter Instrument Co,** producer of electronic equipment, has opened a new factory and office building on Sunnyside Blvd in Plainview, LI, NY. This'll be the fourth time in the company's 14-year history that it's doubled capacity.

## South . . .

**Newport News Shipbuilding & Drydock Co** will build Navy's first atom-powered aircraft carrier. The 75,000-ton ship is expected to cost $314 million, Newport News' portion of the contract will probably be between $150 and $200 million; Westinghouse has an order to build the reactor. Work, starting immediately, may take four years . . . **Martin Co** expects to move into its new guided missile and electronics plant near Orlando, Fla, next month . . . Rumors persist that **Chrysler Corp** plans to put up a $30-million assembly plant in the Atlanta, Ga, area . . . **US Rubber's Naugatuck Chemical Division** will make synthetic rubber and plastic materials at a $7-million installation now under construction in the Baton Rouge, La, area; it's slated for December operation . . . **Noland Co,** Atlanta manufacturer of plumbing supplies, plans a half-million-dollar expansion of its Chattanooga branch . . . **Laclede Steel Co** of St Louis will put up a $600,000 fabricating plant and distribution warehouse on a 7½-acre site located on Tampa Bay, Fla . . . **Herman Stone Co,** Dayton, Ohio, maker of granite surface plates, has opened a new manufacturing plant in Mount Airy, NC . . . **Proctor Electric Co's** $1-million facility, also at Mount Airy, expects to be in production next month. Machinery and equipment were moved from Philadelphia . . . **Ampco Metal, Inc,** Milwaukee producer of aluminum bronzes and products of this alloy, will build a branch foundry at Garland, Texas. The 15,000-sq-ft plant, scheduled to be in operation by March, will include foundries, heat treating facilities, and some machining operations.

**Tricky Mg casting . . .**
This 150-lb magnesium casting, the most complex ever purchased by Dallas's Chance Vought Aircraft, is an air scoop for the Regulus II. The mold itself stands 6 ft high, requires 10 tons of sand. Minimal thickness on walls and webs is 0.24 in., with the solid leading edge tapering to 0.015-in. cast radius. Casting tolerance is ±0.03 in. on dimensions up to 12 in., with an additional ±0.002 inches/inch on dimensions over that

# France's Reborn Auto and Plane Plants Re-Gear for Record Output

**PARIS (McGraw-Hill World News) —France's metalworking industries are today on the brink of their first big postwar productive era. That's true, particularly, of its once-90%-destroyed aircraft industry, and of its automakers, whose sales and production are climbing steadily despite rocketing auto taxes and gasoline prices. Post-Suez fuel rationing, ended late in June, held back sales and output, too.**

In a country of rising incomes—a country that has only one vehicle for every 10 inhabitants—auto sales are bound to climb for several years to come, barring a depression or world crisis, of course. Automakers' order books today are full, and there's an average waiting period of three months for most French cars, with some buyers waiting two years for certain models. Low-horsepower models are increasing in demand as sales of larger cars continue to drop. Because of this, French automakers have been able to keep their sales curves rising by emphasizing production of lighter, cheaper cars.

### Postwar Troubles Over

Going back to the days just after World War II, French automakers were faced with the twin problems of rebuilding badly damaged plants and finding needed raw materials. After a modest start in 1946, the automakers quickly caught up with prewar output. By 1949, they had managed to top 1938 production by 60,000 vehicles.

Except for a slight setback in 1953, France's automotive industry has continued to grow—and at an accelerated pace since 1954, when production jumped to 600,000 vehicles. In 1955, the industry turned out 724,000 cars and trucks. Last year, production totalled 827,000 units for a 38% increase in two years. Output this year is well on its way to an all-time record, with 311,000 vehicles produced in the first quarter.

And as production has gone up, sales have kept pace. In 1954, the industry (automakers and parts makers) grossed $1.47 billion; in 1955 $1.75 billion; in 1956 $2 billion.

An increase in production equipment has accompanied the industry's expansion. A 1943 survey showed that the country's auto makers owned 60,000 machine tools. Although no exact figure for 1957 is available, because some automakers regard such information as secret, France's machine-tool trade association estimates there are now 100,000 machine tools in French automotive plants—about half of which were imported from the US, Germany, Switzerland, Great Britain and Sweden.

There are 17 firms in the French automobile industry, of which five account for 98% of total production. The "Big Five"—Renault, Citroen, Simca, Peugeot and Panhard —own most of the industry's 108-million square feet of factory space, much of which is concentrated in a small suburban belt around Paris.

### Renault Is Expanding

The leading French producer is government-owned Renault. With a work force of 58,000, Renault turned out 274,000 vehicles in 1956 and chalked up $486 million gross sales. In the company's 10 plants, there are a total of 22,000 machine tools, including 200 special production machines, of which 100 are the well-known Renault transfer machines. Most of Renault's machine tools are made in the company's Billancourt plant outside Paris, which also supplies other French and foreign firms.

During 1956, Renault spent $28½ million on new production equipment. This will enable the company to manufacture 300,000 vehicles in 1957, or almost 10% more than last year.

The fastest-growing French automaker is Simca, whose 1956 production of 179,000 vehicles was almost three times that of 1953. Since the company took over Ford of France in 1955, it has grown to seven plants and 20,000 employees. Gross sales of Simca and its two affiliates were $400 million in 1956, of which $54 million was spent for new construction and equipment. Most of the 10,000 machine tools in the Simca plant, as well as the majority of presses, were imported from the US.

Although Simca has considerably stepped up output of its low-horsepower model, the Aronde, total production in 1957 is expected to increase by only 1000 vehicles over last year. Reason is that demand for the medium hp Vedettes (formerly French Fords) has dropped, and production has slowed.

Simca's record as the fastest-growing French auto maker, will be lost this year to Panhard—smallest of the "Big Five," which has three plants, an estimated 4,000 machine tools and 6000 employees. After a big investment in production equipment last year—mostly imported from the US, Germany and Sweden—Panhard is planning to increase 1956 production of 26,000 vehicles by 40% in 1957, expects its '56 gross sales of $85 million to swell.

Of 120,000 French vehicles exported to foreign countries last year, 86,000 went to Europe, 7600 to Asia, 14,500 to North and South America, 7000 to Africa and 4000 to Oceania. This year, foreign exports will increase by a good margin. The French government has been pressing the auto industry — which has never been much interested in exports—to make a special effort. Recently, the "Big Five" promised to export two-thirds of its 1956-57 increase in output. Although the US is the primary goal, French auto people are also eyeing markets in Western Europe and behind the iron curtain.

This year Renault expects to increase foreign sales by 35%, Citroen by 3%, Simca by 5%, and Peugeot by 8%. Panhard hopes to see its exports more than double what they were last year.

### Boom Is Here To Stay

French automobile manufacturers are reluctant to predict how much business they'll be doing a few years from now. But full order books, increasing production facilities and rising exports make it look as if the boom will continue for some time.

France's aircraft producers, like its automakers, believe they are on the threshold of the greatest productive era in their history. Today, they are well out of an exhaustive, and exhausting, period of postwar recon-

struction in which they rebuilt an industry more than 90% destroyed in World War II. Gone today is Frence's era of "lots of aircraft prototypes but no production of planes."

A quick glance at industry employment figures tells the story: from 1950 through 1955 the industry's workforce remained stable at around 60,000. Then in 1956 it began to expand, as prototype work gave way to production models. Today, the aircraft industry employs 80,000 people—42,000 of them in airframe companies, 18,000 in engine plants, 20,000 in parts plants. By 1958's end this figure is expected to jump to 100,000. This would place France in a position to challenge Great Britain for third place among the world's aircraft producers (US is No. 1, USSR No. 2).

### Independence of Foreign Supplies

For some years, the French aircraft industry has been almost totally independent of foreign supply sources, and it has been equally independent of foreign-designed engines and airframes. On the contrary, French engines and frames are today gaining more and more acceptance in world markets.

For instance, the French are now shipping assemblies for nearly 500 transports and jet trainers to West Germany's new air force. Argentina has just agreed to buy 48 French jetpowered liaison planes. And the first made-in-France jet airliner, the Caravelle, has just completed a US-South America sales promotion tour, has sold well. At the moment, the biggest problem among French planemakers is acquisition of needed machine tools and the men to operate them.

France's aircraft industry is made up of 21 firms, of which 15 are in the airframe business and six are engine makers. Actually, many of these 21 companies are small, employing anywhere from 25 to 300 workers. About 90% of France's overall aircraft business is done by three state-owned companies (two airframe makers, one engine maker) and a halfdozen private outfits.

The bulk of the industry's productive capacity is confined to the state-owned plants, but the dividing line between private and state-owned industry is a tenuous one in France, because the government believes in spreading the work around. Result is that very often companies work on each other's planes. That's why Avions Dessault can boast that monthly output at its Merignac assembly plant, near Bordeaux, is about 35 aircraft. But much of the actual manufacturing is done in state-owned plants and the finished parts are shipped to Dessault for final assembly.

Bigger than Dessault in the airframe field is Sud Aviation, a state-owned firm employing about 11,000 people in its 11 plants. Sud Aviation has about 8000 machine tools in all, mostly US made.

France's biggest engine builder, also state-owned, is Societe Nationale d'Etude et de Construction de Moteurs d'Aviation (SNECMA), which employs 10,250 workers in its four Paris-area plants. SNECMA designs and builds many of its own tools.

Avions Dessault, biggest private French airframe maker, employs about 5000 people in its five plants. In the last 10 years, Dessault has turned out about 1200 aircraft, mostly Mystere interceptors. About 60% of Dessault's 1000-or-so machine tools are U S made, a fact that has contributed in a large measure to Dessault's boast that it is the "Rolls-Royce of French Aviation." In fact, many visiting American engineers claim Dessault is better equipped than most British airframe plants.

With the difficult war years and equally different postwar years behind it, France's aircraft industry, like its automobile industry, today faces another vital challenge. In the next two years, it must roll up its collective sleeves and prove to the world that it can produce the aircraft it has conceived on its drawing boards. The future of the French aircraft industry hinges on how well this challenge will be met.

## Chrysler Steps Up Australian Output

**This is one of Chrysler Australia Ltd's eight plants near Adelaide, South Australia, where 30,000 vehicles are now being turned out per year. Newest made-in-Australia Chrysler model is the six-cylinder Royal, shown coming off the assembly lines at right, which features fully automatic transmission, power brakes and advanced styling. Demand for the Royal is now so great that production schedules have been upped considerably in all eight plants, and a new engine plant is now under construction in the Adelaide area**

**Allen E Hermanson** has been promoted from assistant manager to manager of Sundstrand Machine Tool Co's Machine Tools Division in Belvidere and Rockford, Ill

**Kenneth P Martin** has been appointed vice president and general manager of LeMaire Tool & Manufacturing Co. He was formerly vice president of National Automatic Tool Co

**Carl K Shank** has been promoted from general superintendent of manufacturing to works manager of Dodge Manufacturing Co

**Robert N Kendall,** vice president of Colonial Broach & Machine Co, Detroit, is moving to Milwaukee to superintend company activities in the Wisconsin area, formerly handled by manufacturers' agents.

**Dwight A Bessmer,** a vice president of Timken Roller Bearing Co, Canton, Ohio, has been elected executive vice president of the company.

**Donald L Boyes,** general manager of the Hyatt Bearing Division of General Motors Corp, has been named general manager of the Delco-Remy Division, succeeding **H D Dawson,** who is retiring. **Warren E Milner** replaces Mr Boyes.

**Raymond W Larsen** has moved up from the post of assistant to general superintendent of machining operations at Dodge Division of Chrysler Corp.

**R E Esch,** general manager of the International Division of Vickers, Inc, has been elected vice president of the company

**Albert J Seifert** has been named to the new post of manager, manufacturing-engineering of Dalmo Victor Co, Belmont, Calif. He was formerly manager of industrial engineering at Talon Manufacturing, Inc, Meadville, Penna.

**G R Baer,** assistant to the president of Perfect Circle Corp, Hagerstown, Ind, has been named general manufacturing manager.

**George W Hoffmeister** has been named general superintendent of Minneapolis - Honeywell Regulator Co's new plant at Fall River, Mass. He was formerly superintendent of assembly operations in Philadelphia.

**K A Lang** has been made general manager of Lindberg Engineering Co's manufacturing plant in Downey, Calif. He has been serving as manager of the Lindberg-Fisher Melting Division.

**Marquis P Orr** has been promoted from assistant manager to manager of roll sales for E W Bliss Co's Mackintosh-Hemphill Division.

**Claude E Weekly,** product service engineer at MacDermid Inc, Waterbury Conn, and Detroit manufacturer of metal cleaning, plating, and finishing chemicals, has been appointed to head the company's new west coast division, MacDermid Pacific Inc.

**R E Tennery,** general superintendent of Link-Belt Co's Seattle plant, has been transferred to the Los Angeles facility to serve in the same capacity.

## Obituaries

**William Ernst Caldwell,** 73, board chairman of Cleveland Twist Drill Co, died Aug 22. Mr Caldwell joined the company in 1901; in 1951 he was elected vice president and director of sales and served in this capacity until 1956. In addition, he was elected chairman of the board in 1953. He was vice president of the Metal Cutting Tool Institute from 1932 to 1939, president from 1939 to 1942, and continued to serve as vice president from 1943 until the time of his death. **Harold C Hurtt,** 44, assistant to the vice president of sales of Cleveland Twist Drill, also died Aug 22.

**Ralph C Archer,** 65, vice president, manufacturing, of International Harvester Co, died Aug 11 in Lake Forest, Ill.

**Ulrich Eberhardt,** 85, former treasurer and director of Gould & Eberhardt, Inc, Irvington, NJ, and son of one of the founders of the company, died Aug 11.

**H B Spackman,** 58, president and chief executive officer of Lyon Metal Products, Inc, Aurora, Ill, died Aug 20 in New York.

# NEW SHOP EQUIPMENT

## J & L Ram-Type Turret Lathes Made Automatic by Hydraulic Drive

This complete factory assembly, manufactured by Lynn Mfg. Co, Minneapolis, Minn, provides fully automatic cycling on Jones & Lamson ram-type turret lathes—including spindle start, stop and reverse; selection of any of four speeds for each position of hex turret; rapid tool advance; desired rate of feed; controlled dwell; back feed; rapid tool return and indexing of turret at end of cut; cross-slide operation, with cross travel in either direction; open and close collect chucks; and control of indexing chucks and fixtures. The unit may be operated continuously or automatically stopped at any station desired.

Depth settings are made quickly and easily using the mechanic's rule mounted below the stop dog, and a thumb-screw micrometer. Hex turret and cross-slide can be fully tooled in approx 1 hr, 20 min.

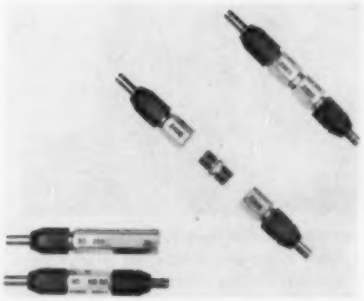
Turret slide is operated hydraulically—and any desired feed may be provided for each station. As turret indexes, tool is rapidly advanced to within 0.030 in. of the work, then reduces to proper feed for that station. Feed adjustments are made separately for each station; each station has individual dwell setting for bottoming the cut. Reverse rate of feed, adjustable for finer or coarser rates than the forward feed, provides for a finish cut on the tool return if desired.

Cross-slide operates automatically in either direction with infinite feed range. Both sides of cross-slide have individual rapid traverse, feed, dwell and reverse, equivalent to the turret drive.

An accessory, called the Reciprocmatic, is designed to clear accumulated chips, when drilling deep holes. Drill is rapidly traversed to the cutting position, feeds into the work for the specified interval and then is rapidly backed out to clear the chips. It is then rapidly traversed to the point where it stopped cutting and shifted into feed for continuing cut. An automatic bar feed is also available.

Time studies have shown that machining time on a piece can be cut 25% in a number of instances, compared to hand-operated lathes. Machine is said to approximate the production rate of an automatic lathe. The basic Lynn unit was described in an earlier issue (*AM*—Feb 19 '57, p198). This particular unit, complete with ½-hp motor, hydraulic pump, welded steel tank, and thermostatic control for constant oil viscosity, has been custom-designed for J&L machines.

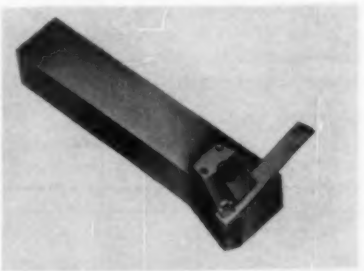
*Jones & Lamson Machine Co, Springfield, Vt*



## Modified Plug Gage Handle Reduces Size Duplication

New Duplex handle allows inspector to combine Go and No Go ends of wire-type plug gages for any double-end combination in a matter of seconds. Members are locked in marked handle units for use as single-end gages or combined for double-end use. On completion of job, ends may be unscrewed from their coupling; and each gage end, complete with its handle and marking, is stored in appropriate numerical order in company's gage cabinet or board. Gage ends are colored red and green.

*Van Keuren Co, 176 Waltham St, Watertown, Mass*

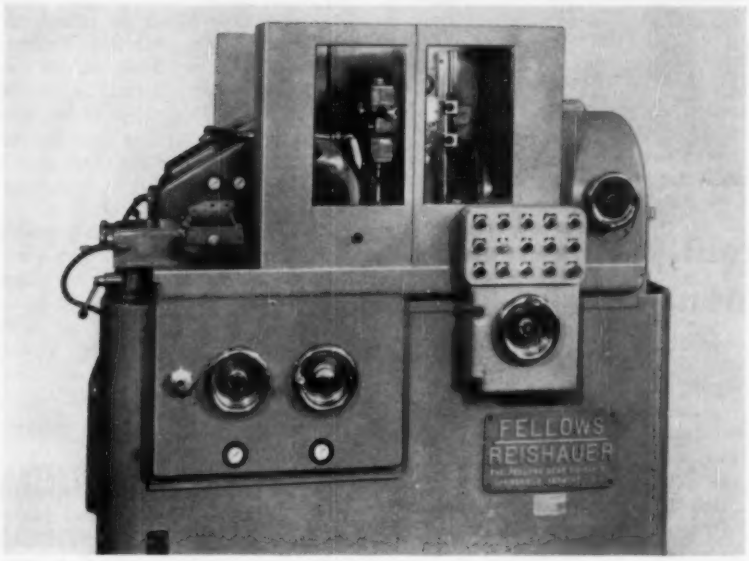


## Carbide Facing-Tool Holder Affords Positive Chip Control

Facing-tool holder affords positive rake, positive center, and positive chip control. Holder is made of heat-treated alloy steel and uses a solid carbide chipbreaker and a solid carbide triangular tool bit. Tool is positioned for positive rake turning—permitting greater depths of cut with reduced tool pressures and up to 30% hp reduction over negative rake tools. New design also permits up to 2-in. reduction on diameter in one pass. Literature available.

*Everede Tool Co, 2000 N Parkside Ave, Chicago 39, Ill*

# MATERIALS AND PARTS




## Fellows-Reishauer Machine Grinds Both Spur and Helical Gears

The exclusive license to manufacture and sell the No. 12 Fellows-Reishauer gear grinding machine in the U S and Canada has been granted to Fellows Gear Shaper Co by the Reishauer Tool Works Ltd, Zurich, Switzerland.

This machine is capable of grinding spur and helical gears up to 12-in. OD and 6¾-in. face width. Pitch range is determined by the leadscrew selected. Two leadscrews are available, one covering from 6 to 48, and the other from 20 to 120 diametral pitch.

Gear tooth shape is generated by an emery wheel on which a helix has been developed. The tooth section of the wheel is usually that of the basic involute rack. In operation, the involute is generated as the grinding wheel turns with the work while the work passes axially by the wheel. There is no mechanical connection between the wheel-spindle and the work-spindle, these being driven by synchronous motors. Grinding is done in both directions of travel of the work-slide. Machine setup is simple and fast, making possible lowcost grinding of single piece lots as well as production runs.

*Fellows Gear Shaper Co, Springfield, Vt*

### Tube-Cutting Machine Handles Tubes up to ½-in. Diameter

Tube cutter can cut tubes made of steel, copper, aluminum, and other metals, in sizes from ⅛-in. dia (max wall thickness 0.028 in.) to ½-in. dia (max wall thickness 0.045 in.). Tubing can be cut to any predetermined length. For lengths from 2 to 30 in. the tubing is cut with the bed of the machine tilted backward, allowing parts to fall into collecting pans. When cutting longer tubing, machine can be set level to line up with table or bench. After cutoff, tubing can be flared without burring. Machine operates at 254 rpm.

*Novi Tool & Machine Co, 25806 Novi Rd, Novi, Mich*

*including . . .*

**MACHINE TOOLS AND ATTACHMENTS**

Milling Machine ..... 187
Drillpress ..... 187
Automatic Turret Lathe ..... 187
Electrical Discharge Machine ..... 188
Vertical Boring Machine ..... 188
Drilling and Tapping Machine ..... 198
Optical Jigborer ..... 204

**TOOLS AND ACCESSORIES**

Ceramic Magnet Chucks ..... 186
Spiral-Fluted Taps ..... 188
Lubricating Pump ..... 194
Carbide End Mills ..... 198
Stamping Machine ..... 202
Portable Electric Drill ..... 204

**FORMING AND FORGING**

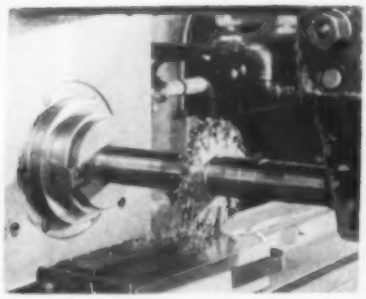
Punchpress ..... 190
Press Brakes ..... 192
Hydraulic Stretcher ..... 192
Powder Metal Press ..... 194
High-Speed Forging Presses ..... 196

**INSPECTION AND LAYOUT**

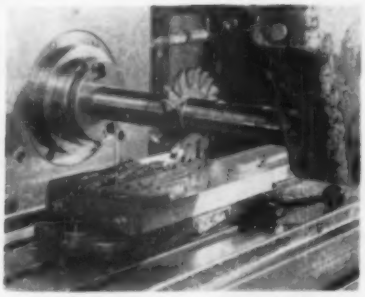
Vibration Meter ..... 194
Optical Flats ..... 196
Optical Measuring Instrument ..... 200
Sine Plate ..... 200

**PLANT SERVICE EQUIPMENT**

Table-Top Conveyor ..... 190
Portable Conveyor ..... 192
Heavy-Duty Lift Truck ..... 198



**Magnetized chips** cling to work and cutter, when chuck uses Alnico magnets



**Chips fall free,** do not clog cutter, when milling with a ceramic-magnet chuck

# Ceramic Magnets Greatly Improve Operation of Permanent Chucks

With a permanent chuck of conventional design (say one using Alnico V magnets), the magnetic field usually extends well beyond the chuck body. Thus, in milling, the cutter, work and machine are magnetized. Chips adhere to the work, the cutter, and may clog or break the cutter teeth, or mar the work. Usually, the operator must stop several times to remove chips when using HSS cutters; this is also true, but to a slightly lesser extent, with carbide cutters.

In grinding, the dust is magnetized and is attracted to table ways and slides, causing wear.

A second problem is the effective hold-down of small-diameter and thin work, when milling or grinding. The usual chuck has coarsely pitched pole pieces, and there are often not enough points at which to tack the work down.

Improved operating conditions can be secured by using ceramic magnets instead of metallic ones. With the introduction of the No. 824—the Nos. 610, 612, and 618 were announced earlier (*AM*—May 20 '57, p196)—a complete line of chucks embodying this improved construction is now available.

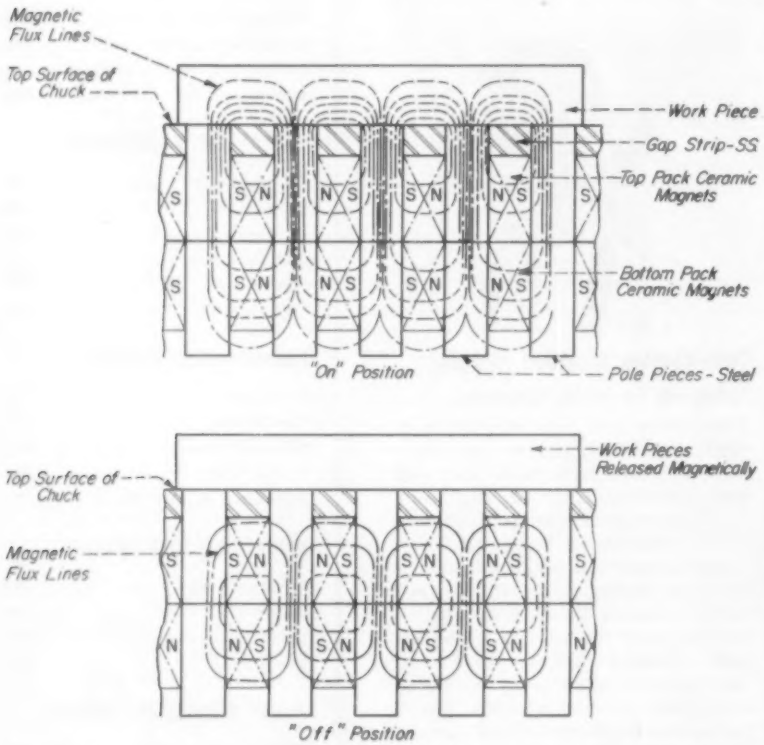
The No. 824 chuck is low—only 2⅜ in. high—which in effect increases machine capacity. Washers as small as ¼ to ⅜ in. in dia and strip stock as thin as 0.015 in. can be held securely. Resistance of work to sliding is much greater than before. Work and cutter are not magnetized; chips fall away freely, as if no magnetism were present.

Ceramic magnets are responsible for these improvements. The ceramic is polarized through its sides, which then magnetize rectangular steel pole pieces. The coercive force is three times that of Alnico V, and the magnetic strength cannot be destroyed by contact with a lifting magnet or lost by dismantling the chuck.

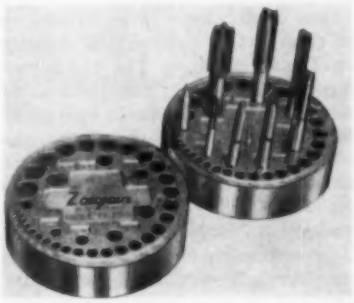
In the "on" position (see sketch) the flux pattern builds up strongly in the steel pole pieces, and jumps the gaps created by the non-magnetic stainless-steel inserts. Numerous closely spaced fields of opposite polarity are thus created at chuck surface, to tack work down. Fine-pitch spacing, ¼ in., is used for the pole pieces. Thus, even small end mills are demagnetized as they pass over segments of opposite polarity.

In the "off" position, the lower "pack," or slidable member, is moved one pitch, so that chuck is, in effect, short circuted, and work can be released. In contrast with Alnico magnets, which never lose quite all their magnetism in the off position, ceramic magnets go through a "zero point" slightly and help to free the work.

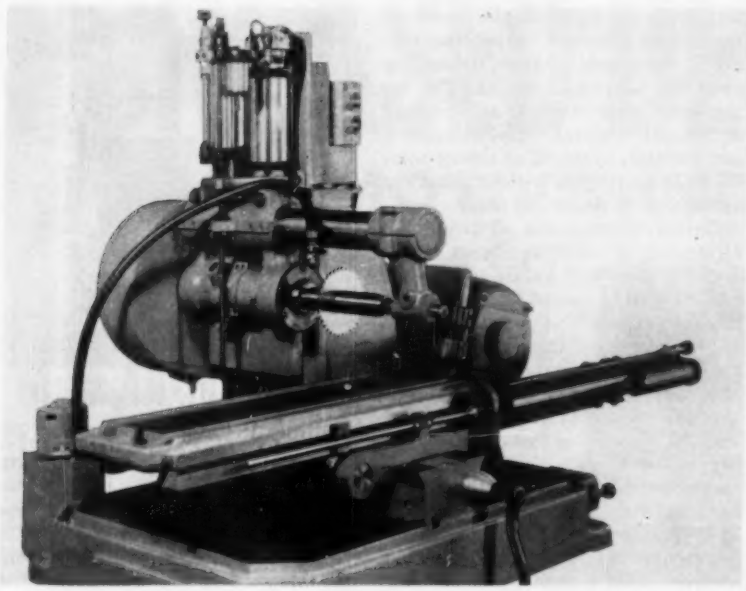
*O S Walker Co, Inc, Worcester, Mass*




**Magnetic flux** is concentrated to produce numerous hold-down zones, because ceramic magnets (labeled as to polarity) are polarized through sides. Top plate is a silver-brazed steel-stainless steel assembly that is truly flat and watertight



**TAP-DRILL STAND** holds drills from 11/16 through ½ in. Next to each drill is a hole for the respective tap. Stand is 4½ in. in dia and has a felt bottom. Price is $2—*Zager, Inc, 23886 Lakeland Blvd, Cleveland 23, Ohio*



## Milling Machine Is Adaptable to Many Production and Toolroom Jobs

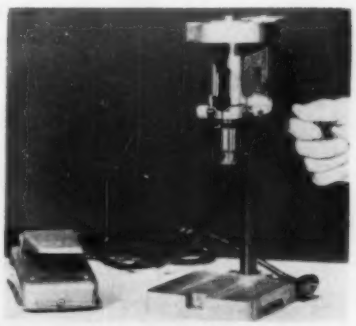
No U S Half-Mill offers unlimited accessory combinations making it a useful production or toolroom milling machine. Applications range from use as an independent head mounted on any base to that of semi-automatic machining with air-hydraulic head and table feeds. Slotting, sawing, keyway cutting, slab milling, boring, and many other operations may be handled on new unit.

Basic Half-Mill, powered by 1 or 2-hp motor, with rack-and-pinion head feed, has numerous production applications. For toolroom and light boring operations, it may be equipped with a micrometer depth stop, screw manual head feed, and longitudinal screw feed table. Combination of 18-in.-stroke air-hydraulic table feed and 4-in.-stroke head feed makes unit into a semi-automatic production machine. For use with carbide or ceramic tooling, it can be equipped with high-speed head and motor, to operate at selective spindle speeds to 5000 rpm.

Head and motor are balanced on a common pivoting arm for sensitive vertical movement.

Coolant system may be added to unit. Reservoir and collecting area are built into the standard base. Also available are overarm supports, riser blocks, and a welded steel pedestal. Catalog available.

*U S Burke Machine Tool Div, Brotherton Rd & PRR, Cincinnati 27, Ohio*



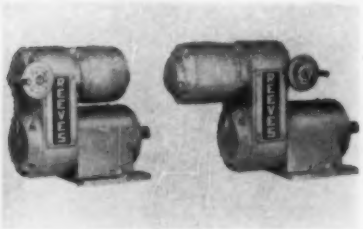
### Drillpress is Designed for Small Hole Production Drilling

Model EPF sensitive drillpress, designed for production drilling of small holes in jig, fixture, and die work, features fast sensitive feed with adjustable spring return to give same feel for each hole, regardless of work size or hole diameter. Precision spindle has two sets of ball bearings; max runout is 0.0004 in.

When foot-pedal rheostat is used, spindle speed can be varied from 500 to 12,000 rpm while leaving both hands free. Drill depth stop is easily adjustable and can be locked for accurate hole depth. Quill can be locked in either up or down position. Dove-tail motor mount allows motor to be removed and flexible shaft unit slipped into place for close-quarter drilling.

Body and base are made of aluminum. Maximum distance from chuck to table is 5 in.; quill travel is ⅞ in.; work table is 4½ in. square. Unit operates on 115v ac-dc. Price, including rheostat, drill chuck, and motor, is $98.50.

*Lloyd Tool Corp, 1620 N Broadway, Burbank, Calif*



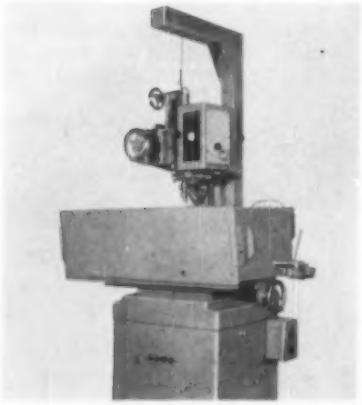

**VARIABLE-SPEED DRIVES, known as Vari-Speed Motodrives, are now available in the 200 and 300 sizes designed for applications ranging from 1 through 5 hp. They are available in two styles—C flow (left) and Z flow (right). In each style, there are several different models and reducers with increased capacity in single, double or triple stages—*Reliance Electric and Eng'g Co, Reeves Pulley Co Div, 1225 Seventh St, Columbus, Ind**

### Potter & Johnston Introduces High-Speed Automatic Turret Lathe

New automatic turret lathe, Model 8-U, has a 40-in.-dia swing over bed ways, chuck sizes to 30 in. and a 50-hp motor. It is intermediate in size between company's present 6DREL and 10-U models. According to manufacturer, machine has been introduced in response to requests for a large, heavy-duty automatic turret lathe with the extra speed and power needed to remove tough alloys fast and with the extra capacity and rigidity required to produce large, heavy components quickly, accurately and economically on a fully automatic cycle basis.

Machine is expected to find application in the manufacture of earth moving and transportation equipment, large electrical motors, aircraft engines and airframes. It is ruggedly constructed throughout with a heavy steel weldment base. There is a wide range of speeds and feeds with four automatic speed changes and three automatic feed changes for each set of pick-off gears. For greatest convenience and efficiency, all slides and spindle motions are controlled from a centralized pushbutton panel.

*Potter & Johnston Co, Pawtucket, RI*



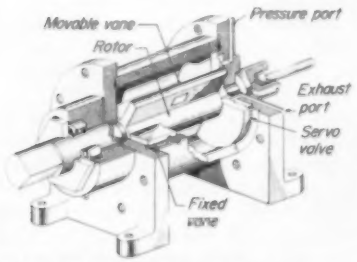
## Electrical Discharge Machine Is Designed for Die Machining

Electrical discharge machine, the M-501 DieMatic, is specifically designed for the die machining field and is completely automatic. Machine can cut any metal regardless of hardness or density. Machining is done by electrical energy, thereby eliminating any force on the tool which in conventional machines causes tool to walk or cut untrue. This also eliminates burred or feathered edges.

Cutting tools can be machined, forged, extruded from free-machining brass or can be cast from Elo-Met, an inexpensive low-temperature alloy developed by the company.

Unit has longitudinal travel on the table, cross-slide travel on the overarm, and vertical adjustment on the cross-slide assembly for easy adjustment of electrode to workpiece. High-volume pump is supplied for fast filling of the worktable pan. Coolant filter is mounted on outside of machine base, to facilitate easy change of filter elements. Power supply is a separate unit. Bulletin 706.01.

*Elox Corp of Michigan, 1830 N Stephenson Hwy, Royal Oak 3, Mich*




## Servo Valve Rotary Actuator Operates on a Closed Loop

Rotary actuator, with integral servo valve control, is actually a high-power, high-torque amplifier which can transform an input in the order of in.-lb into a torque output measuring in thousands of ft-lb, depending upon the particular model. The input shaft lends itself to any method of remote control. Electrically, a servo motor, synchro, or rotary solenoid can do the job with an accuracy as high as ¼ degree of arc.

Device is composed of two basic elements: a rotating input shaft which is coupled to a slide-type valve, and a rotating output shaft which is attached to a set of movable vanes. Models are available with but one set of vanes which move through an arc of 270°; if twice as much torque is required with same package, a second set of vanes is incorporated, but arc is cut to 95°. Unit is available in six models with output torques ranging from 7500 to 360,000 in.-lb at 1000 psi hydraulic pressure. Speed of response is approx 3 sec per stroke at flows from 8 to 60 gpm. At optimum conditions the torque amplification may be as high as 1500:1.

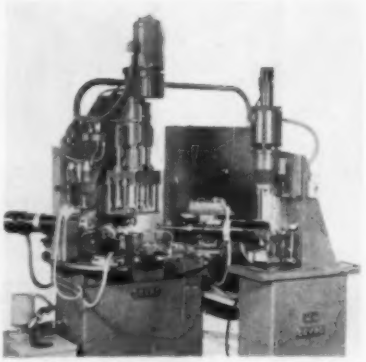
*Industrial Control Products, Inc, 4 Clinton Rd, Caldwell Township, NJ*

## Wadell Vertical Boring Machine Has Rotary Indexing Table

Automatic vertical boring machine, complete with an accurate positioning index table, permits high speed production of precision-bored parts. Boring, turning, chamfering, and other operations can be performed using multiple cutter heads. Vertical design affords full use of two spindles, thus providing two finished parts per cycle.

Illustration shows boring of electric motor end shields. Bore dia is held to 0.0003 in., and concentricity within 0.001 in. Operation is automatic except for loading and unloading.

*Wadell Equipment Co, 159 Terminal Ave, Clark, NJ*



## Dual Machine Is Designed for Multiple Drilling and Tapping

Automatic drilling and tapping machine incorporates two vertical and five horizontal units for drilling and tapping 12 holes in three similar parts. Two holes are drilled in one position; ten in the second position. Operator alternately loads the two machines, completing the drilling operations on a manually clamped fixture (right), and tapping ten holes simultaneously on the second machine (left), which automatically clamps, taps, and releases the part. Output is 300 parts per hr. Tooling changes adapt the machine to variety of operations.

*Govro-Nelson Co, 1933 Antoinette, Detroit 8, Mich*

## Sossner Adds Several Styles to Line of Spiral-Fluted Taps

New styles added to company's line of taps includes two distinctive styles of 2-flute spirals in machine screw sizes and in ¼ and 5/16-in. sizes, and 3-flute spirals in ¼ and 5/16-in. sizes for tapping ferrous metals where extra strength is needed.

The ¼ and 5/16-in. sizes feature a "double-scoop" design said to deliver outstanding results in difficult applications—deep blind holes, for example—and in clinging materials such as copper.

*Sossner Tap & Tool Corp, Lynbrook, NY*

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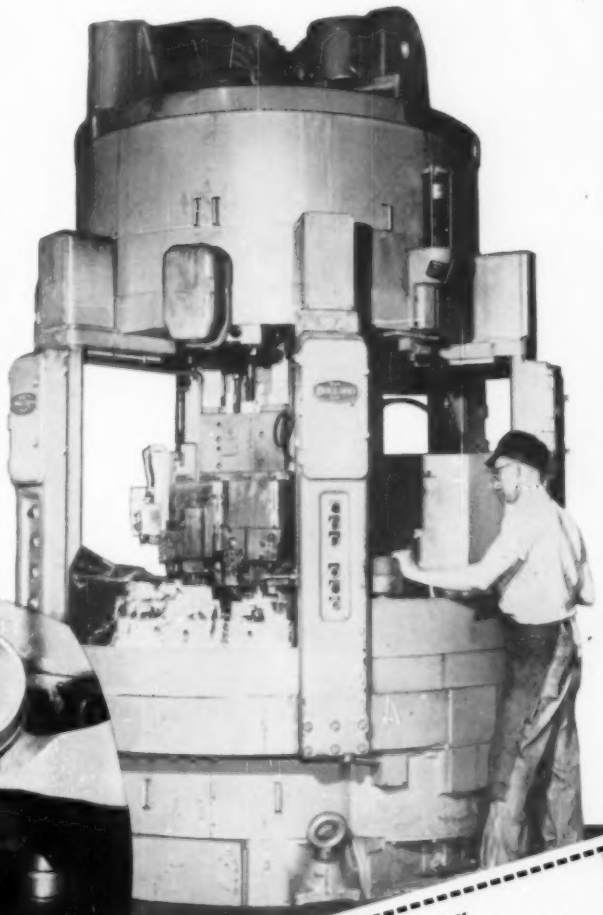
**At present, the machine is tooled for the front drum of an automatic transmission and delivers a finished piece — turned, bored, counterbored and faced — with each index of the table — one every 63 seconds. The end result— more finished pieces per hour at less cost per piece.**



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### MACHINES AND ATTACHMENTS

**1** VARIABLE SPEED LATHES—*Sheldon Machine Co, 4258 N Knox Ave, Chicago 41, Ill.* 4-page illustrated bulletin describes series of 11 and 13-in. units with automatic power selection of spindle speeds from 40 to 2000 rpm, read on built-in tachometer in headstock.

**2** OBI POWER PRESSES—*Sales Service Machine Tool Co, 2362 University Ave, St Paul, Minn.* Bulletin 757 covers complete line of 2 to 85-ton Press-Rite machines including two new single back geared units of 30 and 37½-ton capacity models.

**3** CUTTING UNIT—*S S White Industrial Div, 10 E 40th St, New York 16, NY.* 8-page bulletin 5705 illustrates and describes "Airbrasive" machine for deburring, abrading, and cutting of delicate materials by high-speed stream of gas-propelled abrasive particles. Specifications, operational data, applications, components, key dimensions covered.

**4** NUMERICAL POSITIONING CONTROL—*General Electric Co, Schenectady 5, NY.* 8-page bulletin GEA-6594 gives details on complete industrial system for automatic point-to-point positioning of machines and machine tools. Advantages, theory and operation, applications discussed.

● METAL FORMING—*Grotnes Machine Works, 5454 N Wolcott Ave, Chicago 40, Ill.* Illustrated booklet contains information on basic principles of expanding, shrinking, and roll-forming metal. Illustrates and describes method of forming metal without machining, heat, or destruction. Equipment pictured. Request direct on company letterhead.

### TOOLS AND ACCESSORIES

**5** SOLID HSS MILLING CUTTERS—*Goddard & Goddard Co, 12220 Burt Rd, Detroit 23, Mich.* 32-page catalog HSS-1 describes and illustrates 49 types designed for machining aluminum, light metal alloys, and ferrous materials. Complete specifications for each cutter and accessory toolholders.

**6** OPTICAL TOOLING—*Keuffel & Esser Co, Hoboken, NJ.* 56-page manual covers basic principles. Major instruments and accessories used are illustrated, as well as optical principles in applying the equipment.

**7** BORING BARS—*DeVlieg Microbore, Division of DeVlieg Machine Co, 8720 W 14-Mile Rd, Royal Oak, Mich.* 38-page catalog 58 lists 332 standard general-purpose boring bars, covers range of newly designed standard single tool and two tool bars, boring bar sets, and accessories. Includes application, dimensional, and carbide data, engineering illustrations and flip charts for selection.

**8** CARBIDE TOOLS—*Super Tool Co, 21850 Hoover Rd, Detroit 13, Mich.* 36-page catalog 57 gives specifications and prices on line of carbide-tipped drills, reamers, end mills, countersinks, milling cutters, counterbores, and centers, including new additions to line.

● "GRINDING WHEEL SIMPLIFIED PRACTICE RECOMMENDATIONS"—*Grinding Wheel Institute, 2130 Keith Bldg, Cleveland 15, Ohio.* 76-page edition (R45-57) supersedes the 1947 edition. Part I covers use classification (according to end use); Part II deals with standard shapes and sizes. Request direct on company letterhead.

**9** SYNTHETIC LUBRICANTS—*Lehigh Chemical Co, Industrial Service Dept, Chestertown, Md.* 24-page illustrated manual covers development, testing, and application of engineered lubricants. Charts and graphs demonstrate physical properties of Anderol products in comparison with petroleum lubricants in such factors as volatility, oxidation stability, evaporation.

**10** PORTABLE METAL HARDNESS TESTER—*Newage Industries, Inc, 222 York Rd, Jenkintown, Penna.* 4-page folder illustrates features of 30-oz instrument for testing hardness of any size, shape, or type of metal. Dial registers in Rockwell or Brinell ranges.



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**11** INDICATING AND RECORDING INSTRUMENTS—*General Electric Co, Schenectady 5, NY.* 12-page bulletin GEC-1258A describes variety of generators, indicators, and recorders for measuring speed of any rotating equipment; includes ac and dc tachometer generators and hand tachometers.

**12** MULTI-PURPOSE COOLANT — *Harry Miller Corp, 4th & Bristol Sts, Philadelphia 40, Penna.* 8-page booklet contains information on Hamikleer, a liquid that acts as coolant, lubricant, and rust preventive when mixed with water; applicable to cast iron, hard and soft steels, and other ferrous metals. Advantages, case histories, application data included.

## HEAT TREATING AND WELDING

**13** AUTOMATIC WELDING SUPPLIES—*Lincoln Electric Co, 22777 St Clair Ave, Cleveland 17, Ohio*—8-page bulletin SB-1354 gives data on electrodes and fluxes for submerged arc welding and hardsurfacing. Typical properties of weld deposits tabulated.

**14** GAS BURNERS—*Selas Corp of America, Dresher, Penna.* 10-page bulletin S-1054 discusses Superheat burners that produce high heat release to localized areas of workpieces in variety of applications. Gas and air are burned under pressure to produce flame temps up to 3000 F and blast velocities to 2500 fps.

**15** "RECOMMENDED PRACTICE FOR REPAIR WELDING & FABRICATION WELDING OF STEEL CASTINGS" —*Tempil® Corp, 132 W 22nd St, New York 11, NY.* 1957 edition of 52-page reference manual covers methods; classifies and gives weld-metal properties of electrodes, with trade names and manufacturers for all classes; discusses procedures for welding carbon-steel and low-alloy steel castings.

## PARTS AND MATERIALS

**16** BEARINGS—*Aetna Ball & Roller Bearing Co, 4600 Schubert Ave, Chicago 39, Ill.* 88-page general catalog and engineering manual (15th edition) includes section on new line of sealed, pre-lubricated ball bearing package units. Complete specifications given on company's basic products, plus range of special items.

**17** GENERAL UTILITY STAINLESS STEEL—*Washington Steel Corp, Washington, Penna.* 28-page booklet gives detailed information on Type 430, a nickel-free straight chromium grade. Covers physical properties and analysis, fabrication, applications, and availability of Micro-Rold sheet and strip.

**18** MAGNETIC MOTOR STARTERS—*General Electric Co, Schenectady 5, NY.* 20-page bulletin GEA-6611 contains illustrated data on new 100 line NEMA size 0 and 1 units for machine tools, pumps, motor control center, and variety of other applications. Features, advantages, and dimensions included.

**19** SAFETY SHUTOFF VALVES — *North American Mfg Co, 4455 E 71st St, Cleveland 5, Ohio.* 12-page bulletin 22 illustrates and describes Series 22; gives capacity tables for both low and high pressure gas, and for oil. Mounting positions, installation data, general specifications included.

**20** SINTERED METAL COMPONENTS —*Pegasus International Corp, 1 E 53rd St, New York 22, NY.* Illustrated technical article discusses process, advantages and limitations, quantity considerations, current alloys for structural parts, surface treatments, sinter-brazing, sizing and inspection.

● SOLENOID VALVES — *Automatic Switch Co, Florham Park, NJ.* 114-page catalog 25 with 8 indexed sections contains construction details, flow diagrams, cross-section views and prices on valves from more than 67 standard bulletin classifications. Lists 1400 items, including many new ones. Request on letterhead.

**21** HEXAGON NUTS—*National Machine Products Co, Utica, Mich.* 24-page illustrated catalog gives prices and specifications of sizes from ¼ to 3-in. standard nuts. "12-Pointer" also described as interchangeable with finished or light hexagon in sizes ¼ to ⅝ in. Guide chart for calculating wrench torques included.

**22** DRY FLUID DRIVES AND COUPLINGS — *Dodge Manufacturing Corp, Mishawaka, Ind.* 4-page bulletin A654 describes larger size Flexidyne drives and couplings for use with motors rated up to 75 hp at 1750 rpm. Tables list various motor sizes with which new 15D drive and 15C coupling may be used. Specifies recommended flow charges for hp ratings at various motor speeds, plus other engineering data.

**23** MOTOR STARTERS AND CONTACTORS—*Allis-Chalmers Manufacturing Co, Milwaukee 1, Wis.* 12-page illustrated bulletin 14B8615 describes complete line in sizes 4, 5, and 6 (Type 425), 50 to 400 hp for application to variety of drives including pumps, blowers, fans, screens, and furnace controls.

**24** FASTEST MACHINING STEELS —*Joseph T Ryerson & Son, Inc, Box 8000-A, Chicago 80, Ill.* 4-page bulletin 99-1 (selection guide) covers 20 different types of carbon, alloy, and stainless steel, each designed for maximum output of machined parts. Details on leaded steels and both free cutting bar and plate steels.

**25** SOCKET SCREWS, PLUGS, PINS —*Standard Pressed Steel Co, Box 875, Jenkintown, Penna.* 32-page revision of basic Unbrako catalog presents illustrated data on complete line. Includes detailed size-by-size information on diameters, thread specifications.

**26** TITANIUM CARBIDE ALLOYS — *Kennametal Inc, Latrobe, Penna.* 12-page bulletin B-444 presents illustrated data on heat-resistant Kentanium. Shows parts of simple and complex shapes that have been used successfully at temps ranging to above 1800 F. Physical properties of 13 different compositions, and corrosion resistance, tabulated and charted; general characteristics described in relation to types of applications.

**27** SPHERICAL ROLLER BEARING PILLOW BLOCKS—*Dodge Manufacturing Corp, Mishawaka, Ind.* 8-page bulletin A-668 gives facts on Spher-Align units added to company's line of mounted bearings. Gives tabulated data on dimensions, shaft sizes, weights, and radial load ratings. Applications and features illustrated; replacement parts listed in tabular form.



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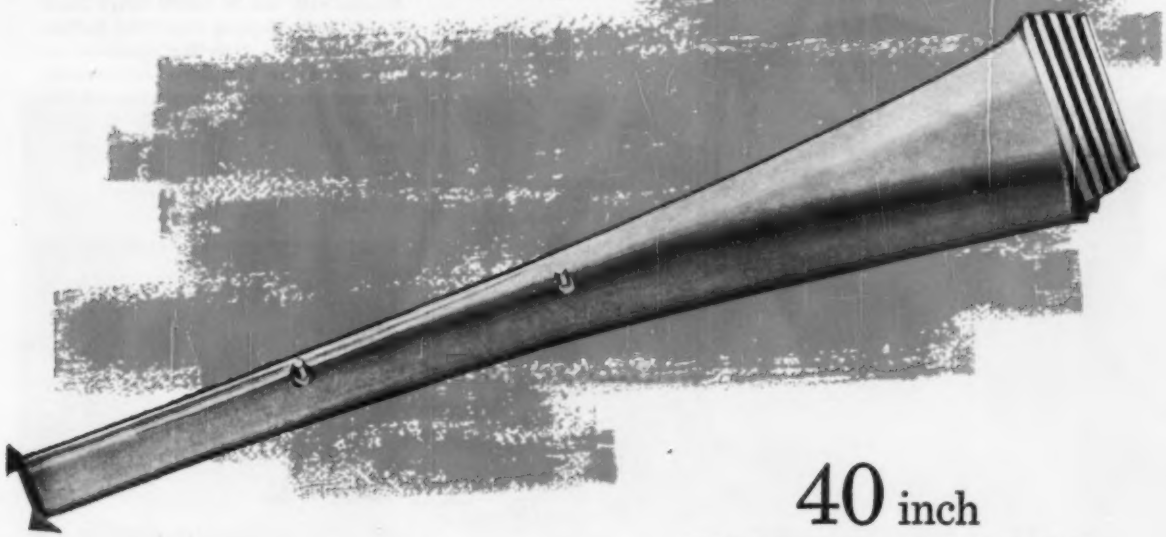
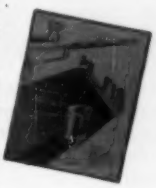


# 40 inch TURBINE BLADES Protected Against High-Velocity Erosion

**...Two rows of 40-inch blades** are shown on this double-flow, low-pressure steam turbine spindle. A 27-in. strip of HAYNES STELLITE alloy has been silver-soldered on each blade as protection against high-velocity erosion.

Blading at the cold end of modern condensing-type steam turbines is subjected to severe erosion. Rim speed of some turbines approaches that of a high speed bullet—even small water particles can cause rapid wear on most metal parts at these high velocities.

Yet when the leading edges of these blades are protected with shields of HAYNES STELLITE alloy, they remain in operation for as long as 19 years! This dramatic example of ruggedness is one of the reasons HAYNES cobalt-base alloys are used in many industries to solve abrasion and erosion problems.



For information on long-wearing and erosion resistant alloys, send for our Booklet. Write HAYNES STELLITE COMPANY, Division of Union Carbide Corporation, General Offices and Works, Kokomo, Indiana.

**HAYNES**
**ALLOYS**
**HAYNES STELLITE COMPANY**
*Division of Union Carbide Corporation*

UNION CARBIDE

"Haynes," "Haynes Stellite" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

## Redesigned Multi-Max Punchpresses Have Capacities of 40 to 125 Tons

Completely redesigned line of Multi-Max punchpresses, representing 5-yr development program, is available in capacities of from 40 to 125 tons; 2 and 4-post models; with speeds from 40 to 1000 spm; bolster and ram areas from 2 x 2 ft to 4 x 12 ft; and with unlimited shut die height. Material can be fed from front to back, back to front, or side to side.

Safety features include two-hand control, with locking device on LH control providing safe one-hand operation; hand switch is automatically off when foot switch is operable; key-lock control on control panel; automatic stop on downward stroke of ram if operator takes hands off controls; in event of power failure, machine automatically fails safe.

*Diamond Machine Tool Corp, Pico, Calif*

### Inching Control Reduces Press Setup Time and Die Damage

Electro-magnetic control, designated the Positive Incher, provides close control of ram movement during all phases of setup or tool and die checking operations—saving up to 50% in setup time and virtually eliminating die damage caused by ram overtravel. Unit connects directly to the motor circuit of power presses, brakes, or shears.

Operator presets exact maximum distance ram can travel with each successive pressing of the starting or jogging button. Smaller movements are achieved by quick tapping of the buttons. Control is furnished in two models: Model CA, for machinery with magnetic starter or contactor; Model SC, for machinery not so equipped.

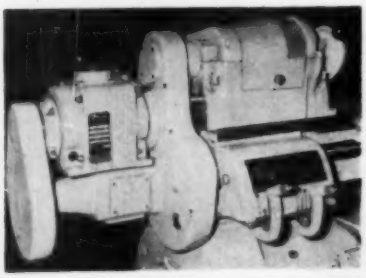
*Carp Controls Co, 30 Meadow St, South Norwalk, Conn*

### Table-Top Conveyor is Designed for Sorting, Assembling, Inspecting

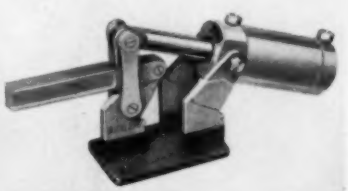
Series T-44 Versa-Veyor table-top unit is designed for sorting, assembling, packaging, and inspection operations. It is available in standard belt widths of 8, 12, 18 and 24 in., has a standard frame length of 10 ft with over-all length of unit 11 ft including end-roll assemblies. Additional units can be added to build lines up to 81 ft in length.

Drive unit is available for fixed belt speeds between 3 and 90 fpm and for 3-to-1 ratio variable belt speeds with lowest speed range from 3 to 30 fpm. Manual stop-start button switch for one-direction operation is furnished as standard equipment; manual stop-start-reverse switch for 2-direction use is available at extra cost. Full line of accessories available.

*Belt Corp, 820 Stahl Rd, Orient, Ohio*



VARIABLE SPEED TRANSMISSION is a high accuracy unit designed for traverse applications on winding machinery. It provides infinite speed range and maintains preset ratio between output and input shaft in spite of wide fluctuations of input speed, including jogging, fast acceleration and deceleration — *Graham Transmissions Inc, Menomonee Falls, Wis*



### Heavy-Duty Toggle Clamp Exerts Holding Pressures up to 2000 lb

Heavy-duty toggle clamp, Model 858, weighs 16 lb, has an over-all length (closed) of 15⅞ in., height of 7¼ in., and delivers holding pressures up to 2000 lb with normal air-line pressure of 90 psi.

Both clamp and base are equipped with hardened bushings and pivot rods. Clamp expectancy under normal operating conditions is reported to be at least 400,000 cycles, while each air cylinder is made to last from 3 to 5 million cycles.

Other features include replaceable components, solid forged work-holding bar, air-operated clamping and unclamping.

*Detroit Stamping Co, Finished Products Div, Detroit, Mich*

# JONES & LAMSON MACHINE COMPANY

the man who needs a new machine tool is already paying for it

## Blessed Event, Plant-Style

They're passing out cigars in the front office. And here on the delivery platform, the production V.P. is on hand personally to welcome the new arrival . . . a J & L Turret Lathe.

Beaming grins like his can be seen throughout the plant, and with good reason: everyone figures to benefit from this new equipment. The operator's job is made easier, and his opportunities for increased compensation are better. Production management can start right away on those new production estimates, and begin planning further improvements. Top management knows that the competitive position of the company is stronger. And right down the line, that profit-sharing plan looks sweeter than ever.

Is *your* company benefiting from the increased production and added versatility offered by advanced J & L equipment?

If not, *why* not? We offer a variety of liberal finance plans, and we'd like to give you all the details. Write today.

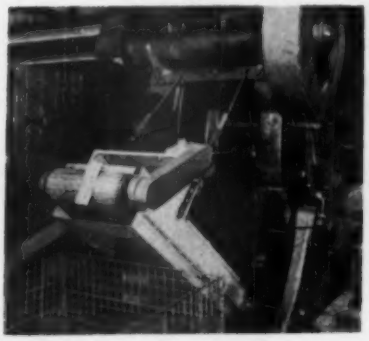
Turret Lathes • Fay Automatic Lathes • Milling & Centering Machines • Optical Comparators • Thread Tools • Thread & Form Grinders

## Torit Collector Recovers Diamonds From Grinding Operations

New collector is designed for installation in either a central collecting system or with unit-type systems and is adaptable to any type of diamond-wheel grinding, whether mist, wick, or dry grinding. Tests show that an average of 30% of the carats originally contained in the grinding wheels were recovered from the swarf caught by this unit.

Device operates on a centrifugal separating principle that eliminates filters entirely. Diamond-bearing dust is deposited in a clear Plexiglas container where it can be visually inspected. Unit has by-pass valve which cuts unit out when other types of wheels are used on grinder. Collector is powered by ½-hp motor, either 110v/60 cycle, single phase, or 220-440v/60 cycle, 3 phase. Price of unit, with flexible hoses, by-pass valve and connections, equipped with the 220-440v power unit, is $198.50.

*Torit Mfg Co, Dept KP-1, Walnut & Exchange Sts, St Paul 2, Minn*



## Portable Conveyor Handles Forgings, Stampings, Small Parts

Series P Versa-Veyor, available in 8, 12, or 16-in. belt widths, provides constant, uniform flow of parts in process and assures efficient handling of parts or scrap. It can be used between machines or from machine to storage or scrap containers. Frame is 14-gage enameled steel; variety of belt materials are available—cotton, neoprene-coated cotton, or woven steel wire.

Drive unit is powered by gearhead motor with roller chain drive to head pulley. Normal belt speed is 60 fpm. Unit can be tilted up to 60°. Two 4-in.-dia wheels make unit easy to move; stationary support stand is available.

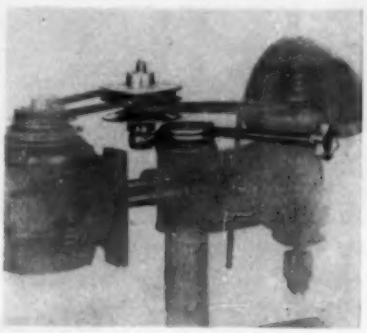
*The Belt Corp, 810 Stahl Rd, Orient, Ohio*

## Power Features Incorporated in Line of Streamlined Press Brakes

Available in 30 and 50-ton models, with over-all bed lengths of 6 to 12 ft, streamlined press brakes incorporate many power features. An electro-pneumatic friction clutch and brake work together to permit ram to be inched down smoothly and softly. Portable power treadle brings new convenience to operator.

Entire drive is inboard. A 50% deeper throat is made possible by use of heavier, deeper uprights. Line of machines is designed for forming, bending, punching, and blanking operations. Bulletin 90.

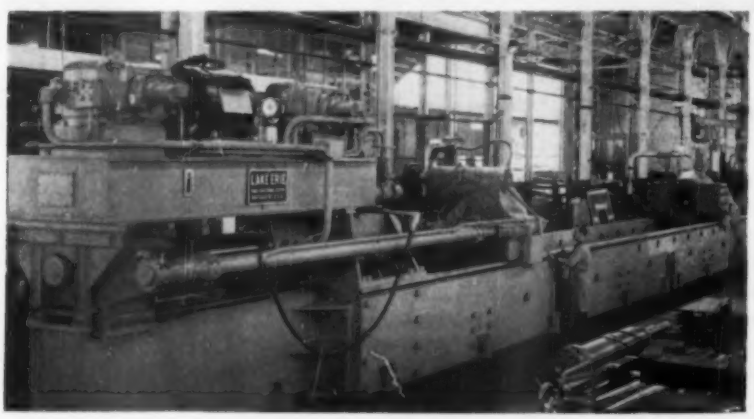
*Niagara Machine & Tool Works, 683 Northland Ave, Buffalo 11, NY*



## Device Allows Changing of Machine Speed Without Stopping Motor

Ratex speed changer, using a self-compensating floating-pulley arrangement, permits the changing of machine speeds instantly without stopping the motor. It is designed for drillpresses, power and feed controls, conveyors, and other devices. Speed range of 6 to 1 ratio is obtainable with fingertip control. Unit attaches to any standard 2¾-in. drill-press support post without the use of tools. Angle brackets are available for special installations.

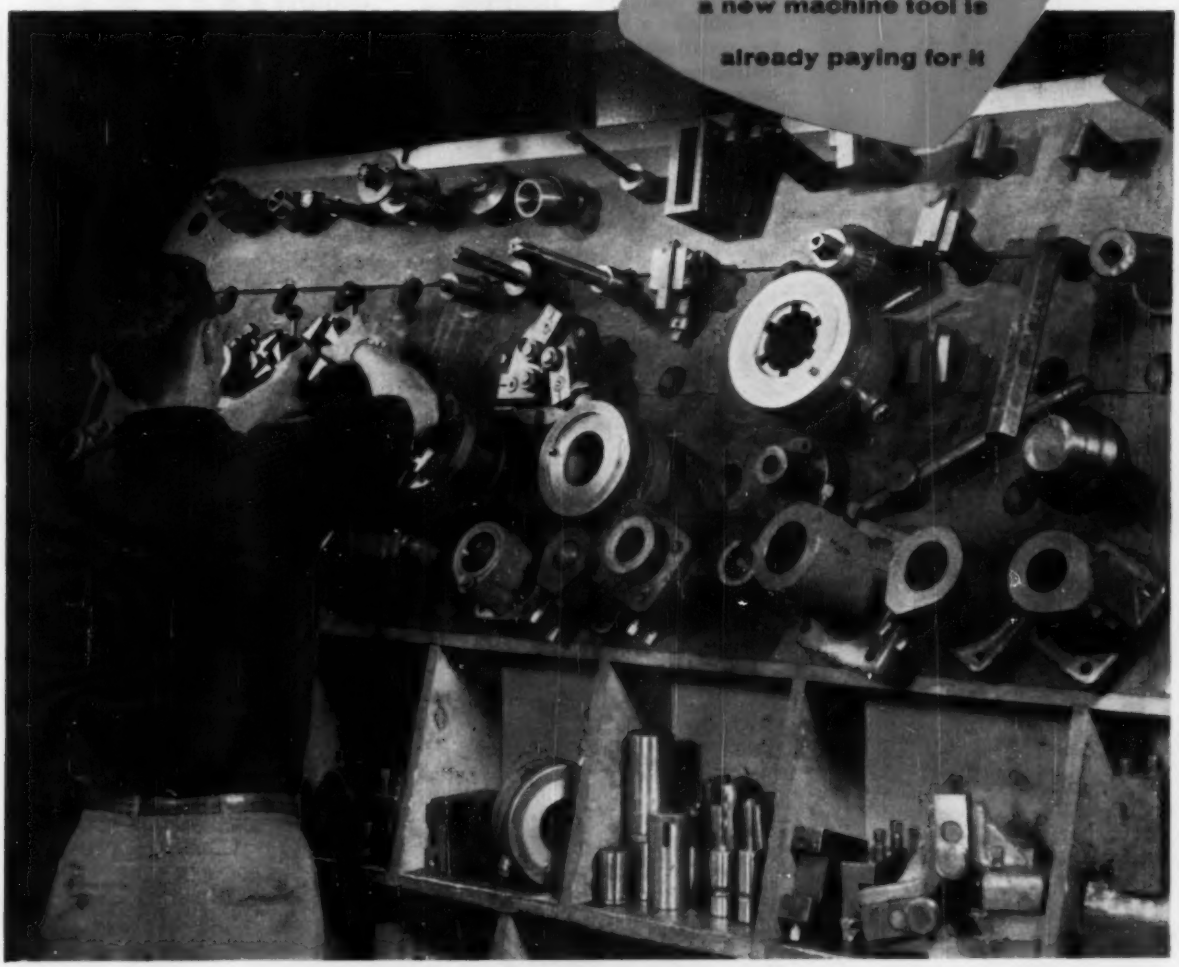
*Custanite Corp, 1228 Utica Ave, Brooklyn 3, NY*



**HYDRAULIC STRETCHER straightens and detwists extrusions ranging from 5 to 50 ft in length. Stretch stroke is 6 ft. Hydraulic system operates at 2550 psi with a take-up speed of 520 ipm, stretching speed of 141 ipm, return speed of 885 ipm. Four-way jaws in rotating head allow quick centering—*Lake Erie Machinery Corp, 507 Woodward Ave, Buffalo, NY**

# JONES & LAMSON THREAD TOOLS

the man who needs a new machine tool is already paying for it



## Each and Every J & L thread tool product guarantees quality... reduces perishable tool cost

J & L's well-known system of "No Approximations" applies right across the board, for all J & L Thread Tool Products.

*Die Heads* – Revolving and stationary types for multi-spindle automatics, drill presses, special machines or turret and engine lathes.

*Tangent Chasers* – Can be changed in seconds; give up to 30 foolproof resharpenings; interchangeable between revolving and stationary types. Class III threads are guaranteed . . . every time!

*Collapsible Taps* – Parts are interchangeable between sizes, including shanks. Chasers are interchangeable with J & L Solid Adjustable Taps.

*Modern-Magic Chucks & Collets* – One-piece shank and body construction.

*Style "M" Stud Setters* – Automatically grip and release studs at proper depths.

Write for brochures "Let's talk about Thread Tools," and "Which Costs More — Machine Tools or Perishables?". JONES & LAMSON MACHINE COMPANY, 502 Clinton St., Springfield, Vermont.

Turret Lathes • Fay Automatic Lathes • Milling & Centering Machines • Optical Comparators • Thread Tools • Thread & Form Grinders

## Press Coins or Sizes Metal-Powder Parts up to 1½ in. High

New 40-ton automatic coining and/or sizing press handles metal-powder parts up to 1½ in. high. Operation takes place in two stages at each stroke of the press. First, the part is positioned in die by a core pin, thereby sizing the ID. Then, upper punch enters die cavity and coins part to a predetermined thickness (density) which consequently fills out the circumference of the cavity representing the requested OD. To achieve uniform density throughout part, a pumpless hydraulic pressure system is provided which may accurately be set to any pressure required in relation to the pressure applied through the twin-toggle-operated upper ram.

Parts are automatically fed from a bowl feeder, through a parts selector, and into a stacker magazine from where they are fed to die cavity one at a time. Press is equipped with a Minster combined air clutch and brake, which allows continuous operation as well as inching.

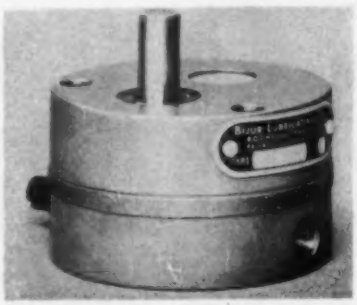
*Haller, Inc, 68½ Ann Arbor Rd, Plymouth, Mich*

## Self-Contained Vibration Meter Requires No Outside Power Source

Electrical instrument, the Sinus Vibrometer, a product of Sweden, utilizes the vibration energy of the vibrating body as its only energy source. It is self-contained and needs no batteries or electrical connections. Device consists of an electrodynamic pickup and an integating and indicating unit. The voltage obtained from the pickup is, within certain limits, proportional to the velocity of the vibration. The electrical integrating device transforms this velocity to an amplitude which is indicated on the meter.

Frequency range is from 13 to over 133 cps—corresponding to 800 to over 8000 rpm. Instrument is available as a portable service unit for occasional or around-the-plant testing, or as a panel-mounted device for continuous vibration supervision. Both models use the same lightweight (15½ oz) pickup. Full line of accessories available.

*Distributed by Eric Wahlquist Business Eng'g, 1827 Norman Ave, Park Ridge, Ill*

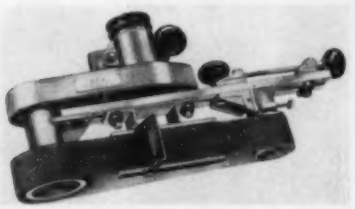


## Bijur Gear Pump is Sealed Against Leakage, Measures 2½ in. in Dia

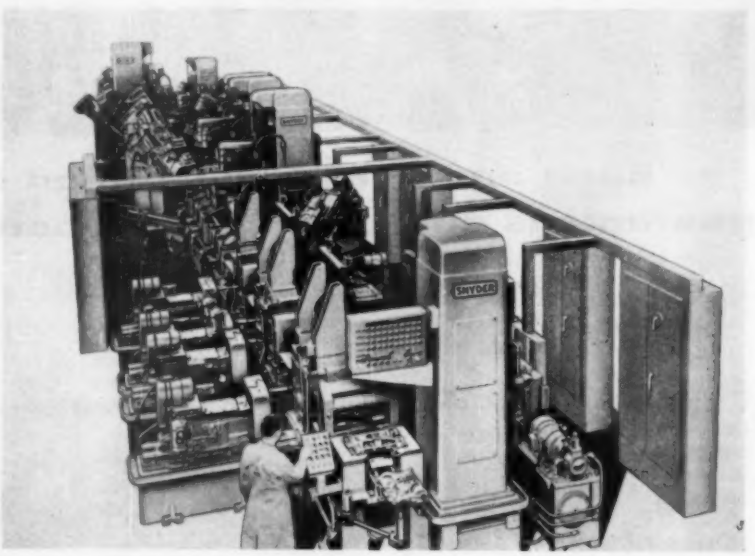
New sealed gear pump, designed to be driven from a rotating machine shaft, is applicable to machine tools, or any other machine requiring flood lubrication over gear trains, chains, or cams. It is intended for recirculation sump systems. Two built-in safety valves permit pump to be driven in either direction.

Discharge is 50 cc per min at 100 rpm; recommended speed range is 20 to 1000 rpm. Pump is capable of pumping at discharge pressure of 150 psi with approx 80% efficiency. Mounting holes permit installation either on bracket or in any position desired on machine surface. Body is iron, pump gears are steel. Drive shaft is provided with flat for setscrew. Bronze body and several other drive shafts are available.

*Bijur Lubricating Corp, 151 W Passaic St, Rochelle Park, NJ*



CONTACT-WHEEL BELT GRINDER is available in two models. Model 400 has 5 x 2-in. contact wheel and 2 x 48-in. abrasive belt; Model 300, 4 x 2-in. wheel and 2 x 36-in. belt. Features are same as for Model 500 (AM —July 30 '56, p138)—*B & E Mfg Co, Inc, Oak Grove, Mo*




AUTOMOTIVE ENGINE INTAKE MANIFOLDS are machined in 175-ft segmented transfer machine line which accepts piece as a rough casting and turns out a finished part. Line consists of two milling lines which operate in parallel and a drilling section (illustrated). Total production is 136 manifolds per hr—*Snyder Tool & Engineering Co, 3400 E Lafayette, Detroit 7, Mich*

# JONES & LAMSON MACHINE TOOLS

the man who needs a new machine tool is already paying for it

## Now — a machine that turns, bores and faces with great accuracy . . . at truly low cost

The new Jones & Lamson Precision Boring Machine may very well be just what *your* production operation needs. This new machine performs turning, boring and facing operations accurately, speedily and economically. Here it is shown on the job at Olson Mfg. Co., Worcester, Mass., turning, facing and boring electronic parts, in lots of 4000 to 6000 pieces. Two O.D.'s are held to .0005″, and two bores to .0002″. Concentricity between the bores, I.D.'s, and faces, is held to a total of .0008″, at high production rates.

The J & L Precision Boring Machine is ideal for both long and short runs . . . is extremely versatile . . . is easy to set up . . . and spindle runout is less than .000020″. Maximum swing is 10″ dia., and maximum bore is 3″ dia. Single or double spindle; push button cycling, manual or automatic.

Write for complete details. JONES & LAMSON MACHINE COMPANY, 502 Clinton Street, Springfield, Vermont.

Turret Lathes • Fay Automatic Lathes • Milling & Centering Machines • Optical Comparators • Thread Tools • Thread & Form Grinders

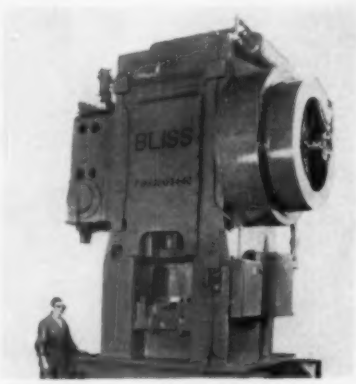
WELDING GUN, called Tec Spot Gun, uses tungsten inert gas arc-welding principle. Gun has built-in welding timer for regulation of weld penetration without readjustment of power source. Welds are said to be comparable in strength to those made by conventional resistance-welding processes—*Tec Torch Co, Inc, 300 Paterson Ave, Carlstadt, NJ*

## Constant Level Electro Oiler Insures Steady Drop Feeding

Device eliminates any variation in drop feeding since oil which feeds the sight feed valve is always at the same level, maintained in base of reservoir. When oil level recedes because of consumption, liquid seal on the spout is temporarily broken. This allows air from air intake to enter the reservoir, releasing oil until seal and proper level is restored. Constant level of oil insures a steady rate of drop feeding regardless of amount in the reservoir.

Unit can be supplied with single or multiple sight feed valves for individual flow to each bearing. Up to 24 valves can be separately adjusted and settings retained by means of a friction screw. Drop feeding to widely separated bearings is controlled and observed from one central point. The solenoid valve is usually wired across the line of the driving motor, starting and stopping with the motor, providing automatic operation.

*Oil-Rite Corp, 2586 Waldo Blvd, Manitowoc, Wis*




## Bliss Redesigns Its Line Of High-Speed Forging Presses

Among the new features of redesigned line of presses is a tonnage limiter which prevents accidental overloading of the press. Device automatically reduces the air pressure on the clutch as slide approaches bottom of stroke, and increases it on the return. Machines now have double clam-shell brakes. Other features include air counter-balances; air-actuated wedge-type die seat; redesigned flywheel brake; and new gear drive for both the limit switch and lubrication pump.

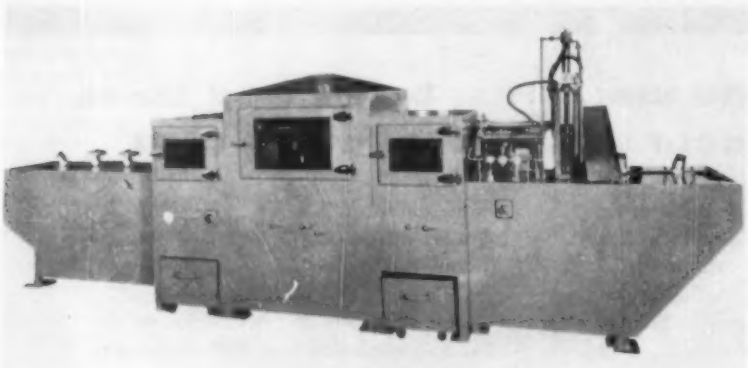
*E W Bliss Co, Canton, Ohio*

## Metallic-Coated Optical Flats Yield Greater Accuracy

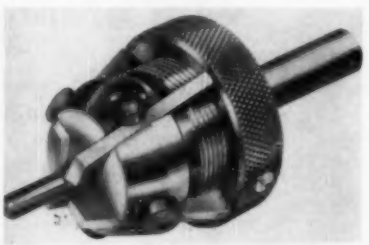
Line of metallic-coated optical flats, known as Micro-Koted Flats, are made of fused quartz and are coated with a hard, durable, metallic material which will not peel or rub off. Upper left side of the flat in the illustration has been coated; lower right side is untreated. It is estimated that readability of coated flats will be five times that of uncoated flats provided work surface is reasonably reflective.

Other advantages claimed are improved accuracy and longer life. The width of the dark fringe is less than half the width of ordinary fringes, or equivalent to about 0.000001 in. of height. Fringe boundaries are more clearly defined and the familiar fuzzy borders are practically eliminated.

*Van Keuren Co, 176 Waltham St, Watertown, Mass*



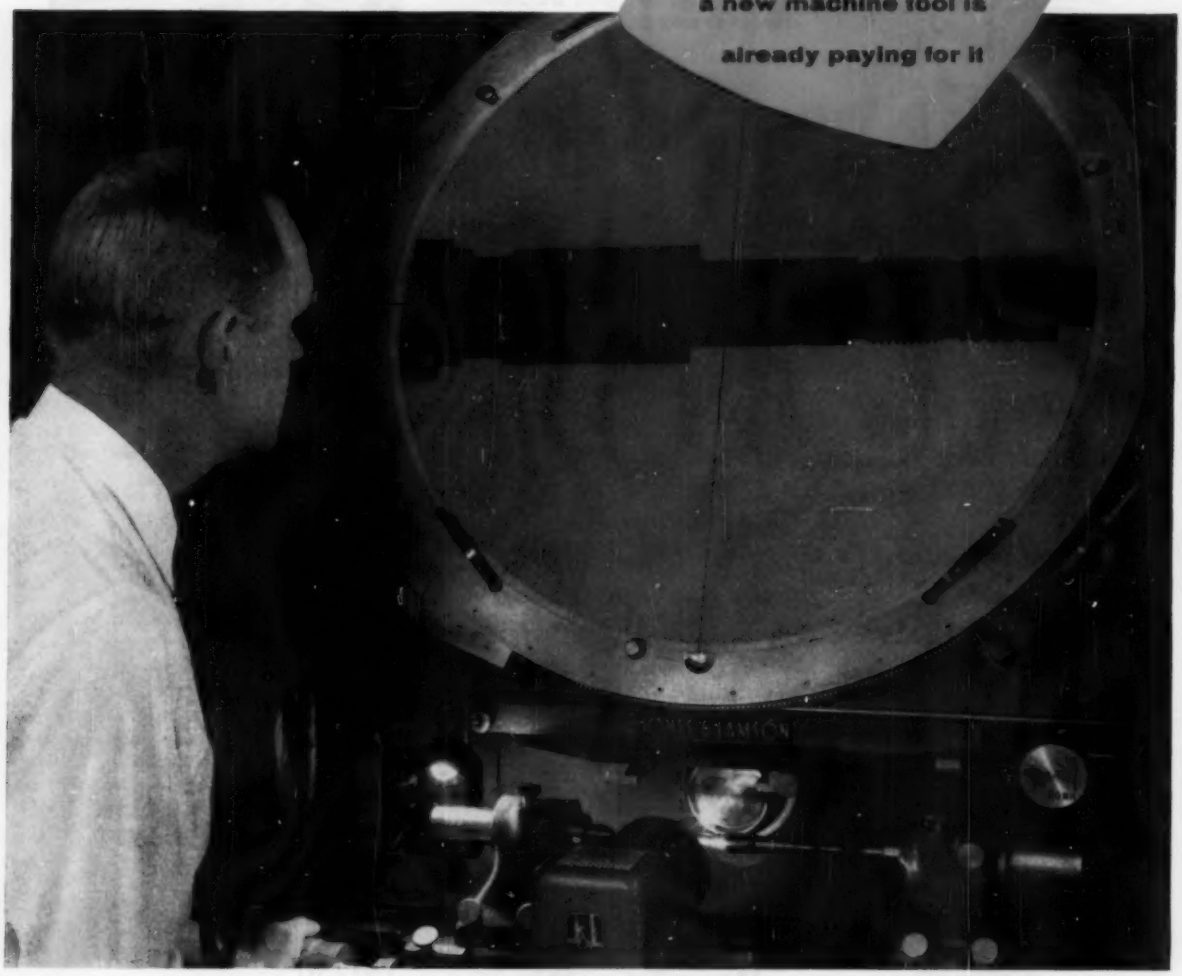
AUTOMATIC CONVEYORIZED BLASTING MACHINE, designed to handle organic abrasives, takes parts (manually loaded at left), indexes them in sequence through: compressed air blow-off cabinet for removal of moisture; blast cabinet where workholding fixtures are rotated under blast guns; secondary blow-off cabinet where residual abrasive grain is removed; then to a selective unloading device which loads parts to left and right where they are accepted by conveyors—*Cro-Plate Co, Inc, 747 Windsor St, Hartford 1, Conn*



TUBE DEBURRING TOOL is available for tubing with OD's from 3/16 to 1¼ in. It is designed to face the end and chamfer inside and outside of standard tubing in one operation—*Genessee Manufacturing Co, 566 Hollenbeck St, Rochester 21, NY*

# JONES & LAMSON OPTICAL COMPARATORS

the man who needs a new machine tool is already paying for it



## Inspections formerly "Impossible" are now done at a glance

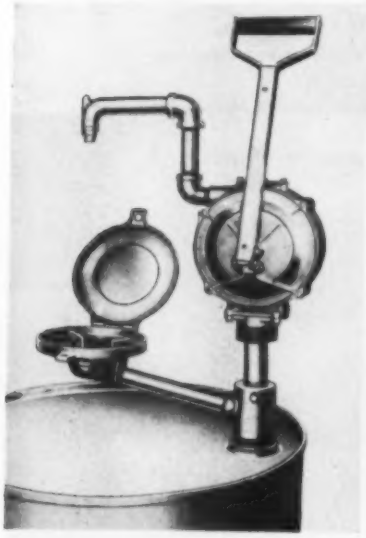
Not so very long ago, the quality control inspection of intricate parts was a mean, painstaking job. It called for a number of gages, lots of computations, a good sense of "feel" and, in many cases, sheer instinct. Even then, there was a margin for error.

Things are quite different now. Take this application, for example. The piece being inspected is a precision gear shaft. Its oil grooves, shoulder lengths and several diameters, as well as the lead, pitch diameter and thread angle of its thread and worm are *all* inspected in *one simple operation* by a Jones & Lamson Optical Comparator. And the inspection is precise, to .0001″.

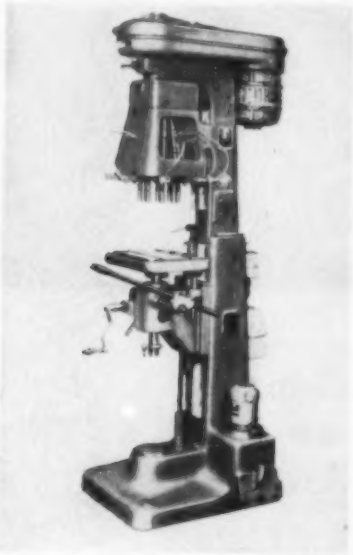
The speed, accuracy and versatility of J & L Comparators could very well improve *your* production. Write for our latest Comparator Catalog. JONES & LAMSON MACHINE COMPANY, 502 Clinton St., Springfield, Vermont.

Turret Lathes • Fay Automatic Lathes • Milling & Centering Machines • Optical Comparators • Thread Tools • Thread & Form Grinders

NEW SHOP EQUIPMENT, MATERIALS, AND PARTS



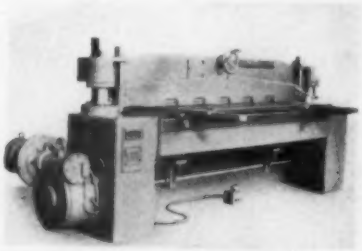
DOUBLE-ACTION HAND PUMP, Model DD-1, pumps 20 gal per 100 strokes of the pump. It handles liquids of almost any viscosity—cutting oils, lubricating oils, grease, solvents, and many others. Unit is available in several designs to fit varied applications—*Wayne Pump Co, Fort Wayne, Ind*



## Multi-Spindle Drilling and Tapping Machine Has Depth Gages

Starrett (Italian) multi-spindle drilling and tapping machine has four normal and four rapid speeds, all with automatic feed. Spindles can be fixed in any position—in circles, straight line, or irregularly. Automatic depth gages are provided. Tapping operations may be done with different pitches, and the accuracy of the reverse rotation of the spindles allows the tapping of dead holes to very close tolerances.

*Distributed by Aaron Machinery Co, Inc, 45 Crosby St, New York 12, NY*

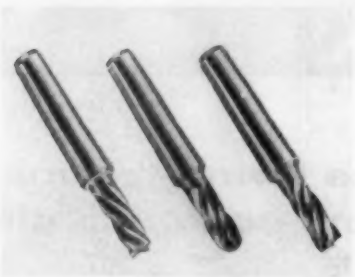


## Heavy-Duty Guillotine Shears Offered in Many Capacities

Scharringhausen shears (German) are built with undercrank or overcrank drive for cutting metal sheets up to 15 ft long and 1¼ in. thick. Model HS/S (illustrated) has a capacity of 8 ft x 14 gage. An unusual feature is the gap provided in the upright behind the cutting blades which permits the trimming and cutting of longer strips than the clearance between the uprights would normally allow.

A variety of standard stops and gages are provided for parallel and square cuts. Special gages for nonstandard work are also available.

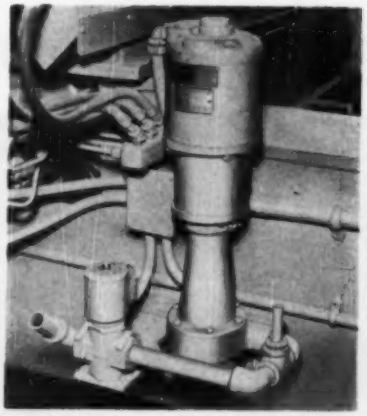
*Imported by S & S Machinery Co, 140 53rd St, Brooklyn 32, NY*



## Complete Line of Carbide End Mills Offered in Draw-Bar or Tang Type

Complete line of carbide end mills is available with B & S tapered steel shanks, in either draw-bar or tang types. The carbide is inserted deep into the steel shank and brazed. Tools are furnished in square-end or ball-nose types, with either RH or LH spirals.

*Rotary Tool Industries, Inc, Dept AM, 4461 W Jefferson Ave, Detroit 9, Mich*



## Long-Shaft Coolant and Circulating Pumps Permit High Liquid Levels

Line of circulating and coolant pumps, designed for sidewall or immersion mounting, have no stuffing boxes, no pump bearings, and no couplings. Long shaft construction permits high liquid levels. Vent holes high in supporting head protect motor should liquid level rise to excessive heights. Balanced impeller is mounted directly on oversize motor shaft eliminating need for coupling; rigidity of shaft eliminates need for bearings.

Sidewall units are built in ¾, 1, and 1½-in. sizes with single discharge, also ¾ and 1¼-in. dual discharge units. Horsepower range is ¼ to 5 with deliveries to 180 gpm at heads to 90 ft. Immersion types are built in ¾ to 3-in. discharge sizes with a hp range from ¼ to 10 and deliveries to 500 gpm at heads to 160 ft. Bulletin 7444 available.

*Ingersoll-Rand, 11 Broadway, New York 4, NY*

HEAVY-DUTY LIFT TRUCK, Model FT-100, has capacity of 10,000 lb. Truck has 2-speed transmission, accepts wide range of standard attachments, and is available with diesel, gasoline, or LP-gas engines—*Allis-Chalmers Mfg Co, Tractor Group, Milwaukee, Wis*

JONES & LAMSON
"AUTOMATION"

the man who needs
a new machine tool is
already paying for it

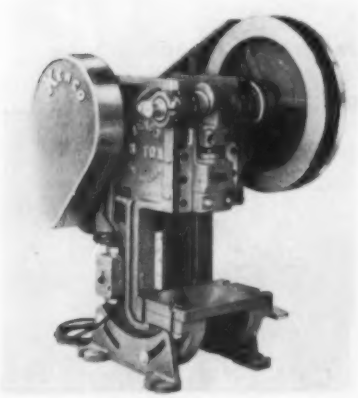
## Now — for the first time in grinding history... no cycle time out for wheel dressing

Jones & Lamson is now introducing "PFC" (perpetual form control) grinding, an automated high production grinding method that has been termed "the greatest improvement in grinding in 50 years." It represents the first broad-scale industrial application of "CDP" (cemented diamond particles).

PFC, the result of several years of cooperative research and development by Jones & Lamson and Koebel Diamond Tool Co., Detroit, makes it possible to (1) *Completely* automate grinders. (2) Re-shape and re-size wheels faster than by any other method, and to do it continuously, with no time out for wheel dressing. (3) Control grinding wheel shape and size throughout a CDP cutter life of many months, without any attention to the cutter-dresser. (4) Provide and maintain a faster-cutting surface, free of debris. (5) Produce and maintain accurate grinding wheel shapes and forms within narrow dimensional limits.

Write for folder No. LO-5709. JONES & LAMSON MACHINE COMPANY, 502 Clinton Street, Springfield, Vermont.

Turret Lathes • Fay Automatic Lathes • Milling & Centering Machines • Optical Comparators • Thread Tools • Thread & Form Grinders



## Slow-Speed Punchpress Features Quiet Operation, Versatility

Quiet operation and quickly varied working speeds are the major features of this 8-ton slow-speed punchpress. Press operates at 90 spm; other speeds from 50 to 200 spm are readily obtained by changing a pully wheel. Positive belt-drive system transmits power fully and smoothly, and is said to eliminate the loud noises inherent in geared presses. Two flywheels are used; the first creates driving momentum and transmits it to the final drive pulley; the second, or large-dia wheel, overcomes belt slippage and transmits power by means of cog-type dacron belts. Press weighs 525 lb. Both standard and deep-throat models are available.

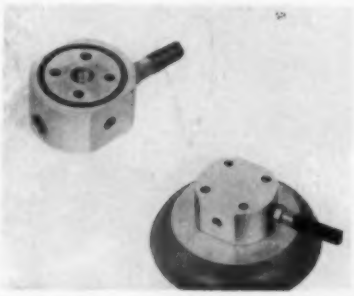
*Kenco Mfg Co, 5211 Telegraph Rd, Los Angeles 22, Calif*

## Optical Measuring Instrument Saves Time, Reduces Errors

Instrument called a coordinate cathetometer makes both a horizontal and vertical measurement in a vertical plane at one setting. Because object being measured does not have to be rotated, inspection time is reduced at least 50% and corresponding resetting errors are eliminated.

Device consists of a microscope or telemicroscope mounted on carriage which is moved up and down on a vertical bar. This assembly is moved left to right or vice versa on horizontal ways. Fine motion adjustment is provided by micrometer screws. Coordinate ranges from 2 x 2 in. up to 42 x 24 in. are available in both English and Metric system. Instruments read to 0.001 in., and are well suited for measurements on large objects; and on objects or points in recessed, remote, or inaccessible locations.

*Gaertner Scientific Corp, 1201 Wrightwood Ave, Chicago 14, Ill*

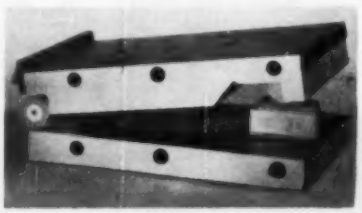


## Venturi-Block Lifting Device Operates on 30 to 40-psi Air

New venturi blocks used in conjunction with company's vacuum cups facilitate lifting or moving of sheet metal, glass, plastics, and many other types of sheet, molded, or stamped materials. Device is made from aluminum alloy and operates at peak efficiency on 35 to 40 lb air pressure.

*Stilson Tool Corp, 30233 Groesbeck Highway, Roseville, Mich*

BABBITT HAMMER has 22-oz head that incorporates a threaded steel insert for attachment to the tubular steel handle. Unit is priced at $2.40, replacement heads, $1.20—*ENS Products, Inc, 721 Beacon St, Loves Park, Ill*

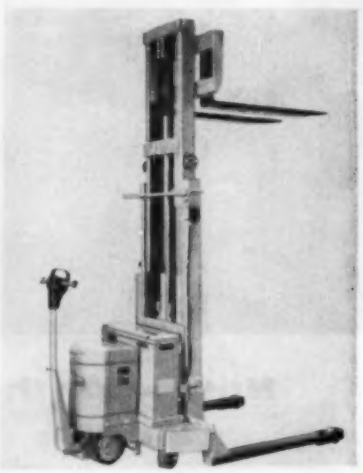


## B & S Sine Plate Gives Angular Accuracy at Reduced Cost

Sine plate, No. 925, has an over-all accuracy within 0.0002 in., giving angular settings gage block accuracy. It is made of normalized steel, case hardened and aged, with high finish on bottom, top, and sides.

End plate is held in place by three screws and the sine plate itself has tapped holes in sides, ends, and top for application of special plates or holding devices. Working surface of the hinged plate is 3½ x 6 in.; center distance between rolls is 5 in. Price is $110. Finished wooden case is available for $5.50.

*Brown & Sharpe Mfg Co, Providence, RI*

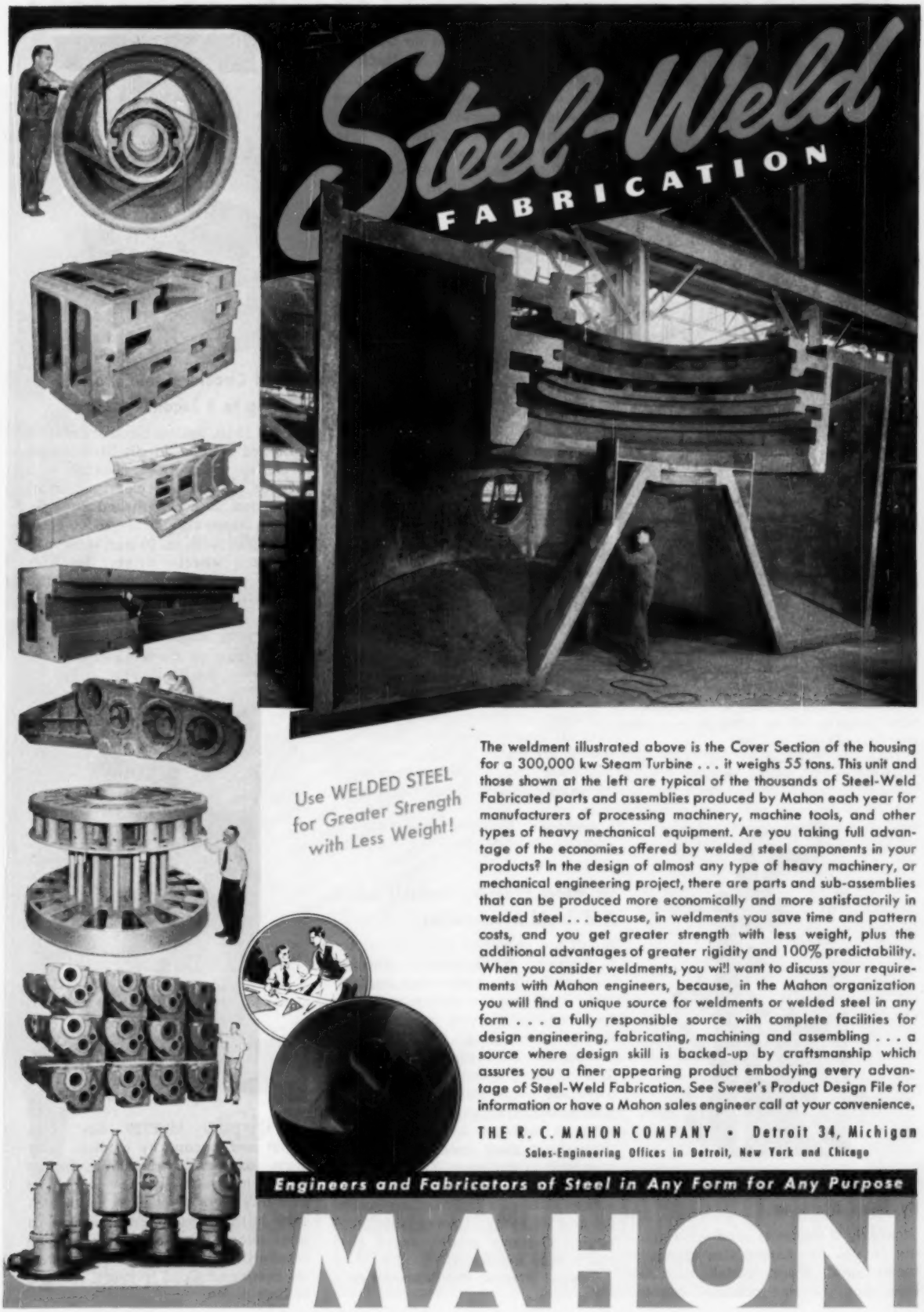


## High-Lift Truck Features Short Turning Radius, Lifts to 128 in.

Improved Model KHL is a straddle-type lift stacker that is said to be ideal for limited capacity elevators and floors. Short turning radius allows high maneuverability. Truck is made in 2000, 3000, and 4000-lb capacities. Telescopic lift reaches 128 in.

Other features include two driving wheels; braking with wheel in any position; sealed alloy gears instead of chains; and greater tire capacity. Bulletin KP.

*Lift Trucks, Inc, Cincinnati 14, Ohio*




Use WELDED STEEL for Greater Strength with Less Weight!

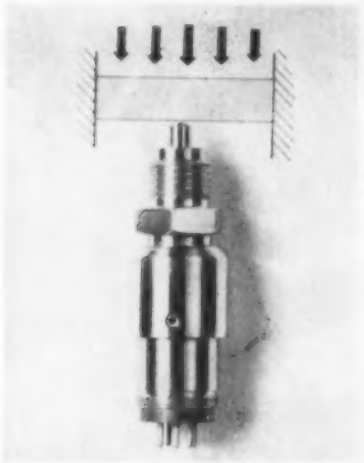
The weldment illustrated above is the Cover Section of the housing for a 300,000 kw Steam Turbine . . . it weighs 55 tons. This unit and those shown at the left are typical of the thousands of Steel-Weld Fabricated parts and assemblies produced by Mahon each year for manufacturers of processing machinery, machine tools, and other types of heavy mechanical equipment. Are you taking full advantage of the economies offered by welded steel components in your products? In the design of almost any type of heavy machinery, or mechanical engineering project, there are parts and sub-assemblies that can be produced more economically and more satisfactorily in welded steel . . . because, in weldments you save time and pattern costs, and you get greater strength with less weight, plus the additional advantages of greater rigidity and 100% predictability. When you consider weldments, you will want to discuss your requirements with Mahon engineers, because, in the Mahon organization you will find a unique source for weldments or welded steel in any form . . . a fully responsible source with complete facilities for design engineering, fabricating, machining and assembling . . . a source where design skill is backed-up by craftsmanship which assures you a finer appearing product embodying every advantage of Steel-Weld Fabrication. See Sweet's Product Design File for information or have a Mahon sales engineer call at your convenience.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York and Chicago

*Engineers and Fabricators of Steel in Any Form for Any Purpose*

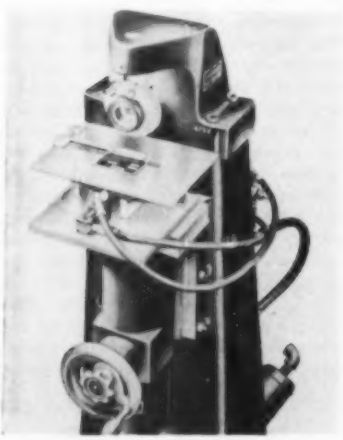
MAHON



## Instrument Measures Loads to 2000 Lb With Movement of 0.00035 in.

New line of strain-gage force pickups measures forces up to 1 ton in applications where the deflection caused by the load is limited to 0.00035 in. Either tension or compression forces may be measured, depending on how device is mounted. Pickup consists of a force probe, an unbonded strain gage, and an electrical strain-gage connector built into small, sturdy cylinder. Units are made of stainless steel, weigh 2 oz, and are available in ranges from 0 to 5 lb up to 0 to 2000 lb. Temperature range is –65 to +350 F; mounting threads are ½—20.

*Dynamic Instrument Co, Inc, 28 Carleton St, Cambridge, Mass*



## Stamping Machine is Powered By Shop Air Line

Stamping machine is used for marking details into nameplates or other metal parts. Floor model machine uses shop air line pressure (20 to 40 psi) and can be used for marking nameplates from 1/32 in. thick to die components or other parts up to 4 in. thick. Variety of dial sizes available, all engraved with alphabet, numerals, period, fraction line, dash, and percent sign.

*Geo T Schmidt, Inc, 4100 N Ravenswood Ave, Chicago 13, Ill*

## All-Hydraulic Fork Truck Eliminates Many Components

Reported to reduce parts and maintenance cost as much as 95%, design of Speedlift line (gasoline or LP-gas operated) eliminates clutch, transmission, differential, drive shaft, and differential axle. The engine turns a hydraulic pump which actuates a hydraulic motor.

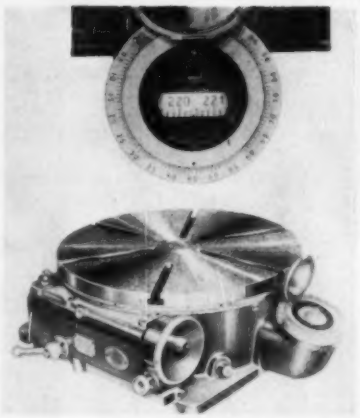
Weight of the truck is 4380 lb; over-all length, less forks, is 84 in.; speeds are up to 11 mph; mast tilts 10° back and 6° forward. Variety of masts and attachments are available.

*Pettibone Mulliken Corp, 141 W Jackson, Chicago, Ill*

## GE Motor Provides Variable Speed And Rapid Acceleration

Small but powerful 2.2-hp dc motor is designed for automatic machine tools and other automated applications requiring the ability to handle frequent starts, stops, reversals, and widely fluctuating loads. Blower cooled, the 200-v motor gains up to 63% of rated speed of 5500 rpm in 0.014 sec from standstill. Unit has 5.16-in.-dia frame and is 15½ in. long. It delivers 2.65 ft-lb torque throughout shaft speed range from standstill to 4500 rpm. Easily applied to most servo systems, motor operates at all angles and can be powered by any dc control power supply. A larger 49-frame model, rated at 1 hp, is also available.

*General Electric Co, Schenectady 5, NY*



## Optical Circular Table Projects Reading to 3 Seconds of Arc

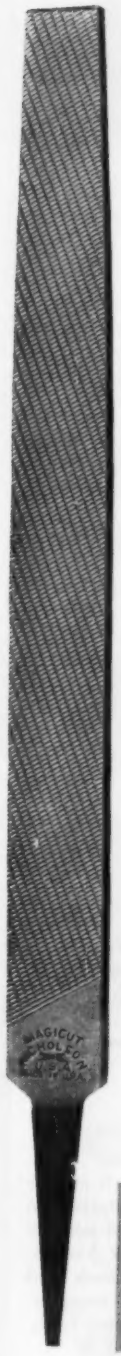
Matrix 18-in. optical circular table is equipped with a 2-in.-dia illuminated screen on which direct readings to 3 seconds of arc are clearly visible. Projection is accomplished by system of lenses from a large-dia glass circle graduated in 10-min intervals.

Worm wheel drive provides smooth and uniform rotation of the table with minimum backlash. Table is securely clamped by two clamps operated by single lever.

*Distributed by Engis Equipment Co, 341 S Dearborn St, Chicago 5, Ill*

**AIR-POWERED RIVETER** has 8-in. throat and a capacity of ⅜-in. solid brass, copper, or iron rivets. Instant change toolholder speeds changing of punches, knurls, and other tools. Machine has adjustable ram stroke and a quick-release air valve. Unit can be supplied as floor or bench model—*Barret Equipment Co, 21st and Cass Ave, St Louis 6, Mo*

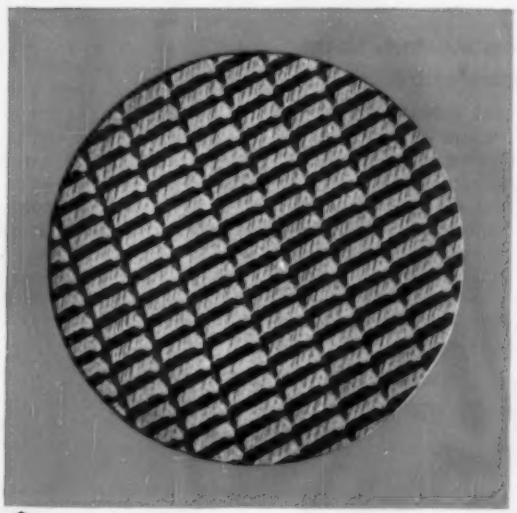
# THE MOST EXCITING FILE NEWS IN YEARS!




*Nicholson announces the new*

## MAGICUT ALL-PURPOSE MACHINIST'S FILE

*with exclusive Penetrating Planer Type Teeth that rough... then smooth all metals in one stroke!*



⬆ This is a close-up (enlarged) of the most efficient All-Purpose Machinist's file you can use. It's available *now* through your Industrial Distributor.

⬅ Note the unique pattern of narrow chip breakers created by steep-angled serrations. This *maximum* cutting surface design gives fast, deep penetration on all metals.

When it comes to file news, it's Nicholson that makes it! The news now is the Magicut—a great new Machinist's file.

The All-Purpose Magicut has a new kind of teeth—Penetrating Planer Type—to rough and smooth all industrial metals in one operation. This new tooth structure, created by Nicholson research, is *super*-efficient.

You'll like the exceptional versatility of the Magicut. You can use it on dense metals like brass and bronze . . . on other metals like annealed tool steel and malleable iron. The Magicut is an All-Purpose Machinist's file for everything from soft aluminum and lead to stainless steel. It comes in Flat, Half Round and Square shapes in 8-, 10-, 12- and 14-inch lengths.

Created by Nicholson researchers, made by Nicholson craftsmen, sold in Nicholson or Black Diamond brands, the Magicut is the most exciting file news in years!

In keeping with his policy of bringing you the newest and finest in equipment and tools, your Industrial Distributor now has the new Magicut file. Ask his representative to show it to you.

NICHOLSON U.S.A.

**NICHOLSON FILE CO., 29 ACORN STREET, PROVIDENCE, RHODE ISLAND**

(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

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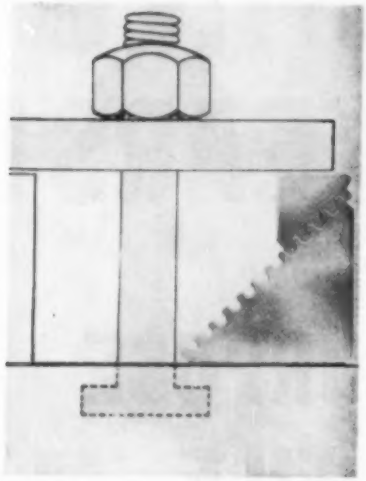
## NICHOLSON and BLACK DIAMOND FILES

***A FILE FOR EVERY PURPOSE***



## Step Blocks Reduce Set-up Time, Give Increased Rigidity

Mermod Master step blocks, product of Switzerland, speed set-up operations, and offer increased rigidity and safety. Specially rounded teeth match prefectly—no danger of slippage. Adjustments can be made in steps of approx 0.04 in.

Full set consists of 16 pieces, 4 each with 5, 9, 12, and 23 teeth. All sets are available in widths of 1.77, 2.76, and 3.54 in., and come in handy aluminum holding tray. Half sets and individual pieces are sold. Prices for full sets range from $20.30 to $39.40, depending on width.

*Distributed by Karl A Neise, 404 Fourth Ave, New York 16, NY*

## Drilling Machine Has Extra Swing And Larger Table for Big Jobs

Adams upright drilling machine has eight standard speeds, ranging from 50 to 950 rpm (other speeds available); and eight feeds, ranging from 0.002 to 0.021 ipr. It has extra room under the spindle, extra swing, and a large table, making possible jobs that would ordinarily require more than one setup. Spindle travel is 10 in.; head travel, 10 in.; table travel, 18 in.

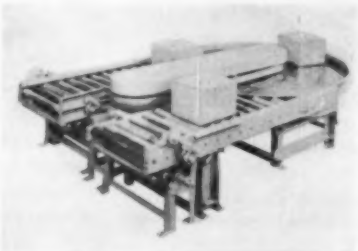
Coolant system consists of a motor-driven centrifugal pump, 5-gal coolant tank, and all necessary lines, fittings, and valves.

*Distributed by Index Machine Co, 543 N Mechanic St, Jackson, Mich*

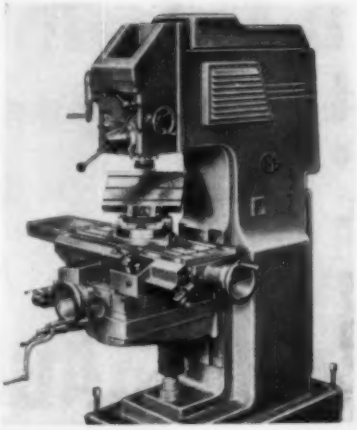
## Air Filter Keeps Moisture, Sludge Out of Air-Operated Devices

Emco Jet, Model L-200A-½ in., operates on maximum of 90 cfm and has a max working pressure of 300 psi. It automatically prevents moisture, sludge, and other foreign substances from entering air-operated devices, thus preventing the deterioration of vital parts. Unit is designed for intermittent operation.

*Emco Pneumatic Corp, 1317 Locust St, Des Moines, Iowa*



CONVEYOR TURNTABLE moves items through 180° turn in 25% less space than conventional powered turntables. Designed for use in either live-roller or powered-belt systems, unit features endless traveling inner guide belt which insures correct tracking. Unit is powered by variable speed motor through a spur gear system—*Alvey-Ferguson Co, 1505 Disney St, Cincinnati 9, Ohio*

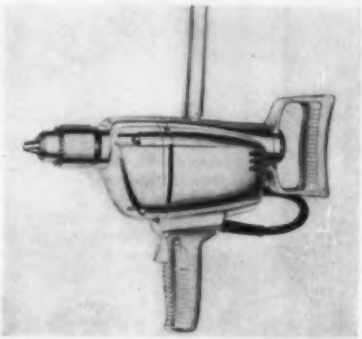


## Jigborer Has Optical Readings To 0.0001 in., Power Feeds

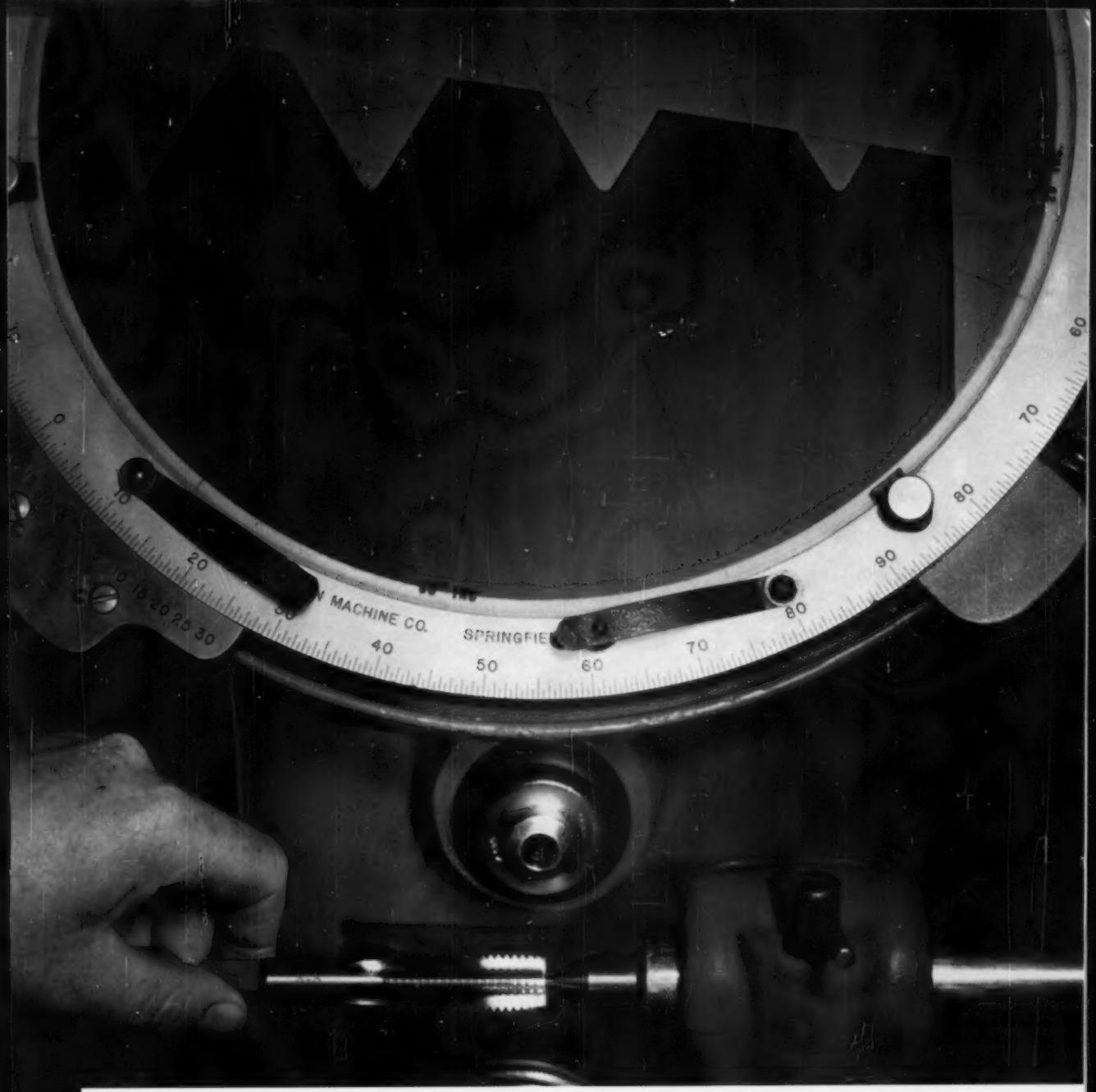
Matheys (Belgian) jigborer, Model 35-NC, has a 33½ x 12-in. work table which can be positioned longitudinally and crosswise in accordance with readings in 0.0001 in. by optical setting devices which scan precision scales located in the saddle and knee. Spindle is driven by 2½-hp motor and has infinitely adjustable speeds ranging from 96 to 1720 rpm. Spindle has No. 30 ASA taper and quick-acting tool retainer nut. Three rates of power feed are provided for the 5½-in. boring depth.

Machine can be equipped with coolant system, optical centering device, machine light fixture, and a variety of vises and other work-holding devices.

*Distributed by Triplex Machine Tool Corp, 75 West St, New York 6, NY*



PORTABLE ELECTRIC DRILL, ½-in. extra-heavy-duty model, features an adjustable (or removable) 4-position rear handle. Unit is rated for 5 amps, and comes with gear-type chuck and key, 10-ft cord, plug, and adapter. Price is $54.95—*Portable Electric Tools, Inc, 320 W 83 St, Chicago 20, Ill*




BODY
BACK TAPER
RAKE
TRUNCATION
POINT

# Chamfer

FLUTES
RELIEF
SHANK
SQUARE
THREADS
CONCENTRICITY

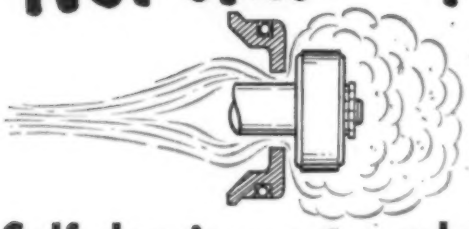
Chamfer "run out" of a tap is the deviation in chamfered thread height from one land to another in relation to the axis. If present to an appreciable degree, this eccentric condition affects hole size and may cause bell mouth in threaded holes and rapid wear on the cutting teeth of taps.

Inspection of chamfers, enormously magnified, is another of the careful quality control checks at "Greenfield" which assure that the taps you buy are as free from faults as constant vigilance can make them.

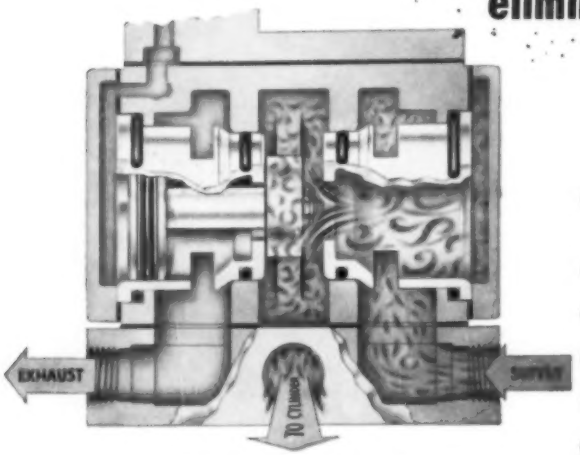
*IF IT CAN BE MEASURED* **GREENFIELD** *MEASURES IT*

**GREENFIELD TAP and DIE CORP.**
**GREENFIELD, MASS.**

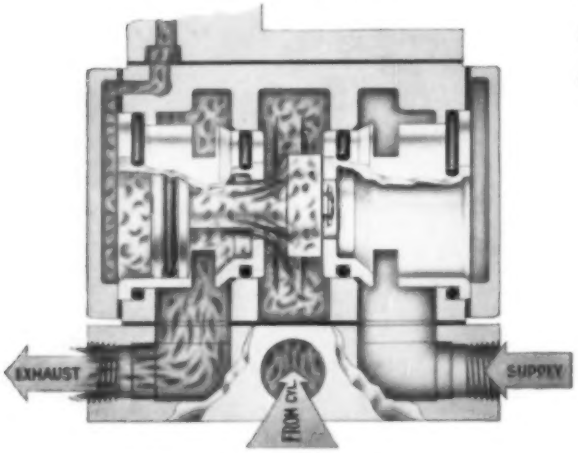
# Not Hurt by Dirt! . . . Another Plus Value in NOPAK-MATIC air control valves



## Self-cleaning seats prolong valve life, eliminate costly valve maintenance




DE-ENERGIZED

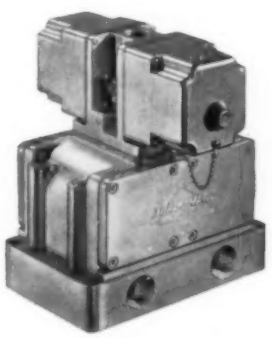



ENERGIZED

With each valve cycle, a blast of air crosses each poppet seat, keeping them free of harmful dirt. But exceptional tolerance to dirty air is only a small part of the Nopak-matic story. It also includes . . .

- **Exclusive "Flow-Director" pilot heads that mean extra versatility and ease of installation.**
- **100% J.I.C. conformance . . . at no extra cost.**
- **Complete pilot head interchangeability.**
- **Low-friction seals for long operating life.**
- **Fast-maintenance design.**
- **Compact, lightweight construction.**
- **Replaceable, self-cleaning seats.**
- **Choice of either side or bottom ported 4-Way.**
- **Split second response—Full flow.**

SERIES 310 — 2- or 3-Way
Single Solenoid Pilot Controlled
(maintained contact type)



SERIES 420 — 4-Way
Double Solenoid Pilot Controlled
(momentary contact type)

*NOPAK-MATIC* Plus Value Valves are available in ¼", ⅜", ½" and ¾" pipe sizes, for 2- or 3-Way Normally Open or Normally Closed or 4-Way operation with master (air), single or double solenoid pilot control heads.

# NOPAK VALVES and CYLINDERS

GALLAND-HENNING NOPAK DIVISION • 2707 South 31st St. • Milwaukee 46, Wis.

Send for **Catalog 105** —it contains complete details of all Nopak-matic features, dimensions, installation data, and parts lists. Send now and your catalog will be forwarded promptly.

A6-604-1P

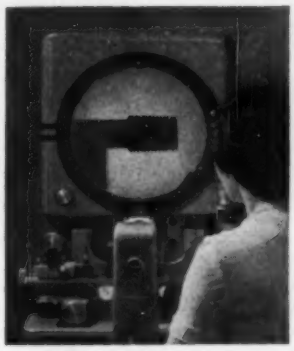
# How Minneapolis-Honeywell holds tapers to a tolerance of ± 2′ ...at a glance

**Small tapered needle valves at Honeywell's Brown Instruments Division are tough to gage quickly and accurately. Read how optical gaging makes the job easy.**

This tapered needle valve is used to reset a pneumatic process control system. Typical dimensions are 1 19/32″ overall with critical taper section less than ½″ long. The actual taper is 2°14′, plus or minus 2′. Since the valve only moves .030″ in regulating flow, accuracy is critical if the flow rate is to be precisely controlled.

This is the sort of measuring job optical gaging thrives on. At Brown Instruments Division of Minneapolis-Honeywell Regulator Company they use a Kodak Contour Projector to check these pieces at the rate of one every 2½ minutes, picking up not only taper but eight other dimensions and concentricity. With optical gaging they find accuracy is greater, since "feel" is eliminated. Production personnel can *see* any variation from tolerance—there's no disagreement between the manufacturing and inspection. And gage wear has been eliminated as a factor in reducing accuracy.

Got a tough-to-measure part like this? Is gaging taking too long or tieing up too many highly trained men? Is inspection holding up production? Optical gaging on a Kodak Contour Projector may be the answer. To find out more about how it can work for you, send for the booklet "Projection Gaging with Kodak Contour Projectors."

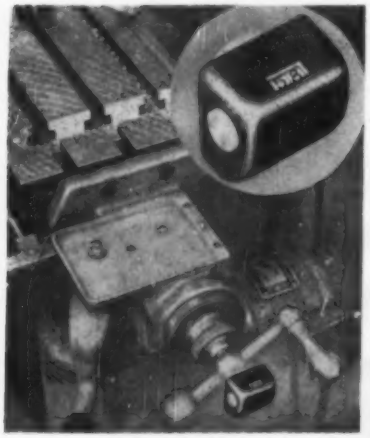


A single Contour Projector checks a wide variety of parts simply by changing charts and fixtures.

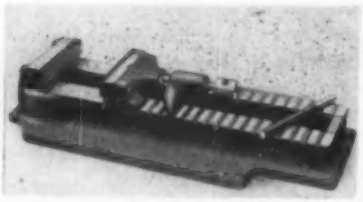
**EASTMAN KODAK COMPANY, Rochester 4, N. Y.**
**Apparatus and Optical Division**

## the KODAK CONTOUR PROJECTOR

Kodak
TRADE MARK



LEADSCREW REVOLUTION COUNTER is designed for use on all types of milling machines and other machine tools, where a cumulative count of leadscrew turns is desired. It can be installed easily, fits all standard milling machines, and is made in various thread sizes to fit any special leadscrew-handle bolts. Unit illustrated, Model 0.123, sells for $39.50—*Pacific Transducer Corp, 11836 W Pico Blvd, Los Angeles 64, Calif*



## Hold-Down Vise Provides Accurate Seating, One-Hand Tightening

Taylor hold-down vise is said to provide accurate seating, eliminate the need for parallels and hammering, and to grip work tighter than other hold-down vises. There are 24 models to choose from, with jaws ranging from 3 to 8 in.

A 3-in. vise will take up to 7 in. between the jaws; an 8-in. vise will take up to 18 in. Prices start at $45.

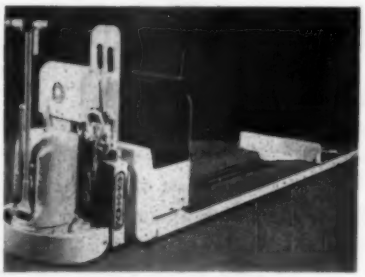
*Distributed by Wharton Unitools, PO Box 202, Valley Stream, LI, NY*

## Consumable-Electrode Welding Process Developed for Magnesium

Continuous welding of magnesium, using the shielded inert-arc, consumable-electrode process, has been successfully developed. Difficulty in maintaining constant electrical contact between electrode wire and the current-carrying member of the welding machine has resulted in frequent "burn-backs" when used with magnesium. New device eliminates this problem, and company reports continuous welds up to 30 ft and welds on wide variety of magnesium ranging from ⅛ in. to heavy plate.

Process is said to be four to six times faster than hand welding and to provide greater weld penetration.

*Copperloy Corp, Lite-Line Metal Industries Div, 4105 Brookpark Rd, Cleveland 24, Ohio*

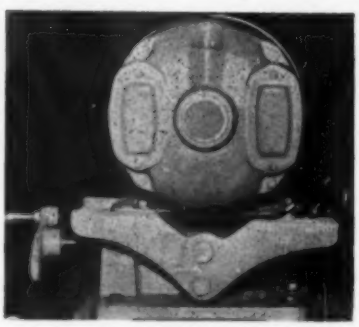


## Platform Truck Has Pusher Bar For Self-Unloading Operation

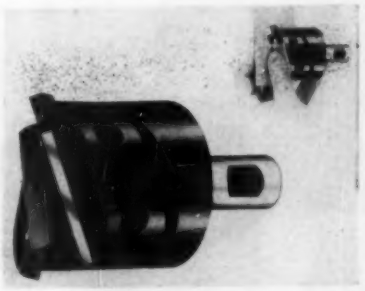
Walkie-type truck is especially designed for loading of freight cars and trailers with long, flat loads. After positioning, the hydraulically actuated bar pushes the material off the platform onto the floor.

Standard model is 135 in. long by 39 in. wide. Lowered height of platform is 2⅜ in.; it has a lift of 4¾ in. and is 96 in. long. Pusher bar has 85-in. travel, can push a load of 8000 lb. Truck is powered with an 18-v heavy-duty power unit.

*Moto-Truc Co, 1959 E 59th St, Cleveland 3, Ohio*



TILTING MOTOR BASE compensates for belt tension when speed changes are made while machine is running, and also makes belt changing easier. Base is 5½ by 7½ in.; one size fits all fractional-hp motors—*Lovejoy Flexible Coupling Co, 4966 W Lake St, Chicago 44, Ill*



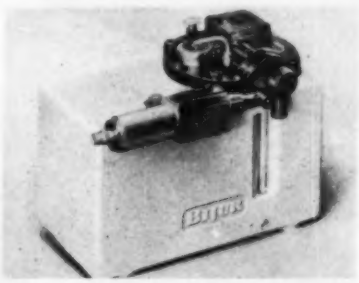
## Heavy-Duty Milling Cutter Uses Two Carbide Inserts

Face mill cutter, designated Manchester, is made of SAE 4140 heat-treated steel, and can take a 2½-in.-dia cut. Shear cutting action of the double inserts offers a fast, yet unusually well finished surface. Inserts can be changed in a matter of seconds and easily reset with a tool setting gage. Tool is available with ¾ or 1-in. shanks. Tool setting gage is supplied with each cutter.

*Portage Double Quick, Inc, 1026 Sweitzer Ave, Akron 11, Ohio*

**Single open-end wrenches** forged of alloy steel have been added to company's line of wrenches and shop tools. Heads are offset 15°. Finish is heavy chrome plate over copper and nickel.

*Billings and Spencer Co, Hartford 1, Conn*



## Hydraulic Lubricator Operates Under Extremely High Pressures

Hydraulic lubricator, designated Cyclic Y, is designed for applications where desired lubricant discharge per machine cycle is relatively small. Unit operates on any hydraulic line pressure from 500 to 3000 psi and delivers 2 cc of oil per lubricating cycle. By resetting hydraulic piston-stroke adjustment any one of seven different lubrication cycles can be obtained. Reservoir holds 6 pt.

*Bijur Lubricating Corp, Rochelle Park, NJ*

# MAN AT WORK! MAKING MONEY!

"in the production of special precision parts...."

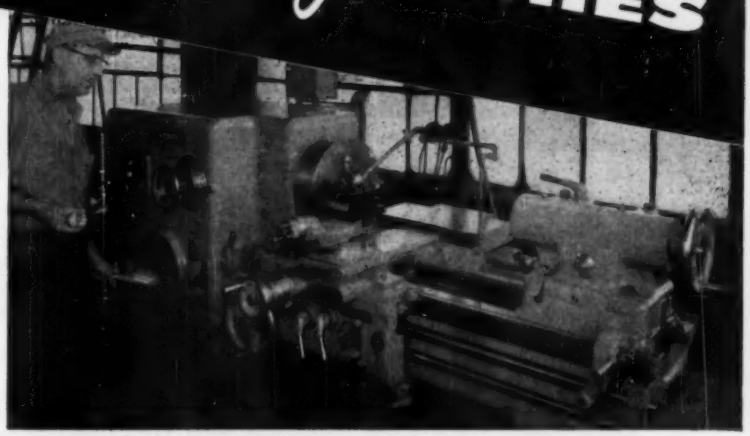
HENRY VOGT MACHINE CO.
LOUISVILLE, KY.

depend on

## SIDNEY *Heavy-Duty* LATHES

The scales turn in favor of SIDNEY HEAVY DUTY LATHES on any type of work . . . turning standardized "mass production" work in impressive quantities . . . or turning special precision parts, as illustrated in this photograph. Henry Vogt Machine Co. makes forged steel valves and fittings, water tube boilers, refrigerating machinery and other equipment.

The type or quantity of work doesn't phase these lathes . . . it's all part of the "cost-less, produce-more" story.



AUTOMATIC, HYDRAULIC DIAL CONTROLLED CHANGE
32 SELECTIVE SPINDLE SPEEDS IN GEOMETRIC PROGRESSION

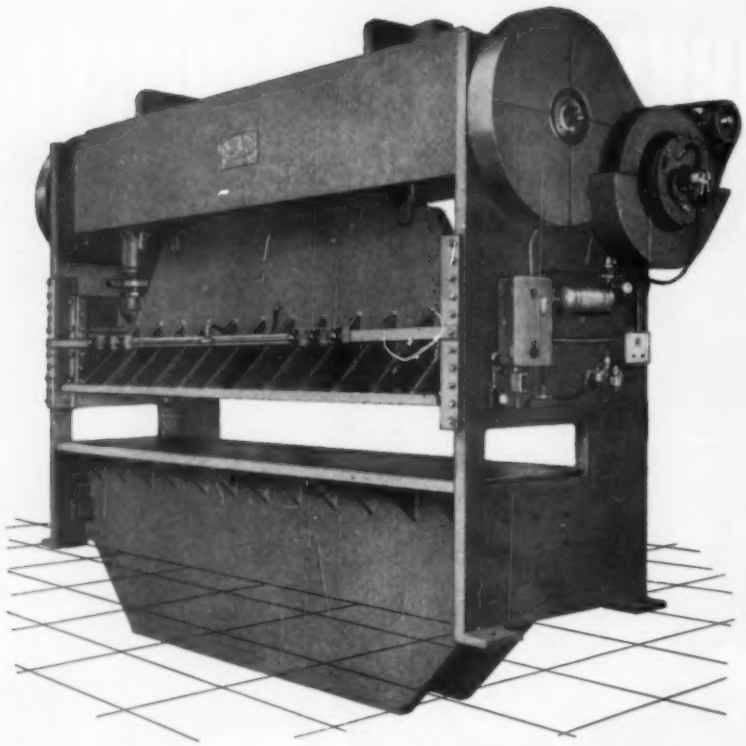
—one of the many Sidney "firsts" which have been making history as far back as 1947.

SIDNEY LATHES are precision tools, designed for rigidity, accuracy and dependability, regardless of the severity of the operation performed. Exceptionally smooth and quiet. A size and speed available for your plant.

Write for bulletins or for representative to call at your convenience.

**THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO**

*Builders of Precision Machinery since 1904*



CHICAGO DREIS & KRUMP

# PRESSES
STRAIGHT-SIDE TYPE

*large die area*
*capacities up to 400 tons*

This is a typical model of CHICAGO straight-side-type presses used for multiple punching, notching, and trimming operations. This press with a die area of 48 inches by 198 inches has a capacity of 200 tons.

*Complete recommendations for any job on request.*

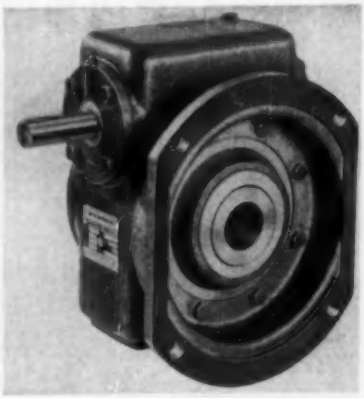
6674

CHICAGO DREIS & KRUMP

Press Brakes • Straight-Side-Type Presses • Press Brake Dies
Hand and Power Bending Brakes • Special Metal-Forming Machines

**DREIS & KRUMP**
**MANUFACTURING CO.**
**7434 South Loomis Boulevard, Chicago 36, Illinois**





## Winsmith Worm-Gear Speed Reducers Mount on Driven Shaft

Two series of worm gear, shaft-mounted speed reducers have been added to company's line. Series ST, a torque-arm type; and Series SF, a flange-mounted type (illustrated). Both are available in three sizes in ratios ranging from 7.5:1 to 77:1, hp range of 0.63 to 8.82, and a max output torque range of 816 to 7678 in.-lb. Reducers mount directly on shaft of the driven machine, thus requiring less space than conventional reducers because mounting arrangement eliminates couplings and bedplates.

Slow-speed shaft of both models is provided with two external slots to facilitate removal of reducer from driven machine with standard wheel puller. Bulletin SM-57 available.

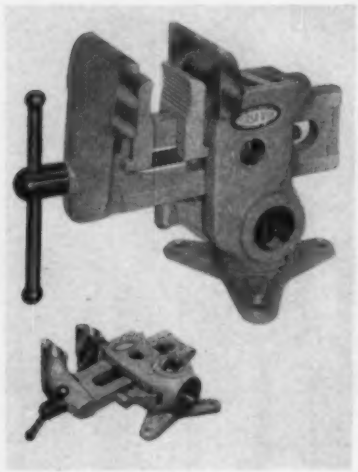
*Winsmith, Inc, Springville (Erie County), NY*

**Tubular hardfacing electrodes,** designed for use with company's MF welder, are said to deposit metal up to 200% faster than the fastest manual rods. Electrodes are available in two types: S/A manganese wire coils, for manganese steel buildup and repair applications; and S/A 53 for hardfacing to resist wear and impact. Electrodes are 3/32 in. in diameter.

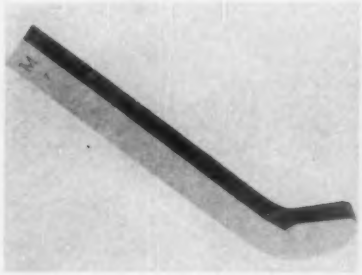
*American Brake Shoe Co, American Manganese Steel Div, Chicago Heights, Ill*

**Protective paper,** No. 190, is designed to guard highly finished surfaces against marring in fabrication, shipment, or storage. It is self-adhering and comes off cleanly. Paper is 6.5 mils thick, comes in 100-yd rolls, and is available in widths of 12, 24, 30, 36, 36½, 48, and 48½ in.

*Behr-Manning Co, Troy, NY*



VISE, designated Versa-Vise, offers both smooth jaws and replaceable serrated jaws. Unit turns a full 360° and can be locked in any position by tightening the jaw handle. Price is $13.95—*Will-Burt Co, Dept AMN, Orrville, Ohio*



## Forged HSS Tools Offer Economy And Long Cutting Life

Forged, high-speed-steel tools, designated Mac-I tools, are heat treated to proper hardness and sandblasted to eliminate roughness. Hardness obtained is in range $R_c$ 62-64. Tools are forged from alloy steels, each adapted to customer specification.

A typical tool is illustrated. This left-hand round-nose roughing tool is adaptable to many roughing operations.

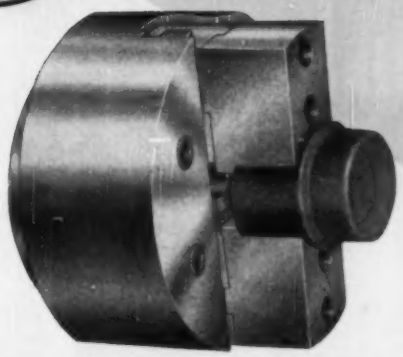
*MacInnes Steel Sales Co, 202 Marine Bank Bldg, Erie, Penna*

**Pump oiler,** No. 58 Eaglet, is made of copper-coated steel and holds 4 oz of oil. It is equipped with a rigid 3-in. spout. Price 98¢.

*Eagle Mfg Co, 2523 Charles St, Wellsburg, W Va*

*(Continued on page 212)*

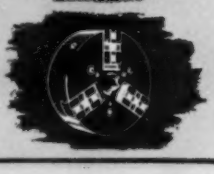

SP POWER CHUCKS



for more gripping power–
higher production

Famous S-P cam and lever design holds the work tighter, permits cost cutting heavy feeds and multiple cuts. S-P cam and lever design also resists opening of jaws by centrifugal force or diminishing air pressure . . . an important safety factor. Balanced for high rpm.

**S-P SELF-CENTERING CHUCKS** are built in Universal American Standard models, sizes 6" — 8" — 10" — 12", and Serrated models in 8" — 10" — 12" sizes. Two or three jaws.



**S-P COMPENSATING CHUCKS** grip out-of-round work with equal pressure on each jaw. Available in 8" — 10" — 12" sizes, two and three jaw models, American Standard or Serrated.

**S-P ROTATING CYLINDERS**

**Air and Hydraulic**

Adequate stroke for long jaw travel of S-P Chucks. Balanced for high rpm on machine tools and other applications. Details in Catalog No. 105 (Air) and Bul. 201 (Hydraulic).

S-P Power Chucks are installed as original equipment by Bardons & Oliver, Cleveland Automatic, Cone Automatic, Ex-Cell-O, Jones & Lamson, Monarch, Warner & Swasey . . . and many others. Representatives in principal cities. Prompt deliveries. Send for catalog No. 105. The S-P Manufacturing Corporation, 30201 Aurora Rd., Solon, Ohio.

SPecify SP

THE S-P MANUFACTURING CORP.
SOLON, OHIO • IN GREATER CLEVELAND
ESTABLISHED 1916 A BASSETT COMPANY

NON-ROTATING AIR AND HYDRAULIC CYLINDERS • ROTATING AIR AND HYDRAULIC CYLINDERS
POWER CHUCKS • COLLET AND DRILL PRESS CHUCKS • AIR PISTONS, VALVES, ACCESSORIES

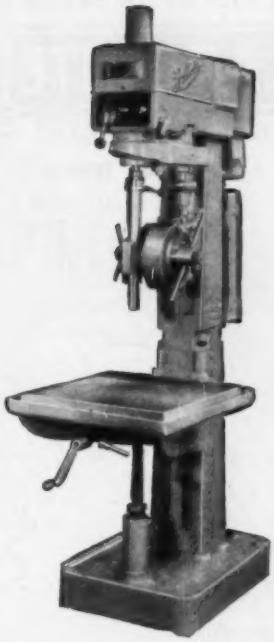
# "BUFFALO" CAN SPEED UP YOUR TOUGHEST

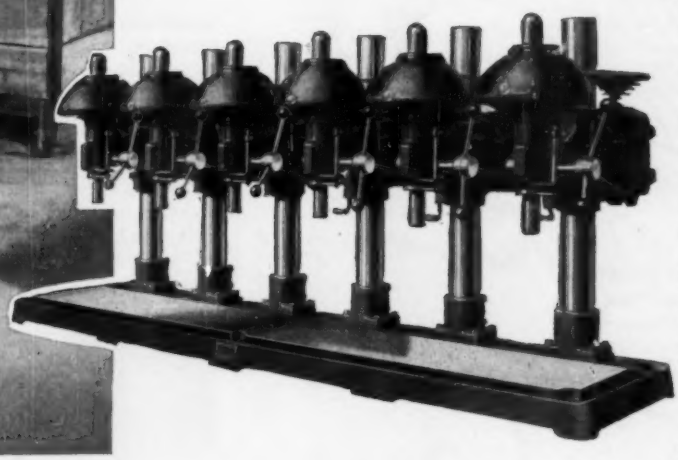
**COMPLEX HIGH-CAPACITY DRILLING, TAPPING OPERATIONS FLOW SMOOTHLY** — with a line of "Buffalo" No. 22 Drills like that above, turning out liquid meters at a high rate. Each operator handles 2 to 4 setups without stopping for adjustments, and each spindle has both power and sensitive feed. Note that all controls are easily reached — these giant 96"-high machines handle as easily as small sensitive drills, yet have 1¼" capacity in mild steel! Hand-scraped ways, husky 5.5" dia. columns, precision 6-spline spindles over 1" in least diameter. Write for Bulletin 2989G and see how these quality machines could be increasing your output and cutting costs.

ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

DRILLING • PUNCHING • SHEARING • BENDING

**CHANGE DRILLING SPEEDS WITHOUT TIME-OUTS** and enjoy the smoothest operation in drill history with the great new "RPMster"! Its gearless drive provides instant, infinite spindle speed changes between 100 to 550 RPM's and 500 to 3000 RPM's. Here is the really versatile machine for uninterrupted work flow through its entire capacity range of drilling, reaming and tapping. And the "RPMster" offers every other feature for accuracy and convenience — "Buffalo" all-geared power feed, back gearing, easy-action table-raising screw, hand scraped ways and vibration-free operation. Write for details and a demonstration of the "Q" Factor* built into this precision machine.



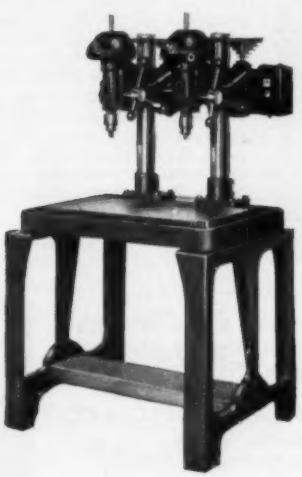


**MULTIPLE OPERATIONS — HEAVY PRODUCTION UP TO 1"**—"Buffalo" No. 18 Drills are offered in 19 models to fit your operation exactly — everything from single spindle bench or floor models to 6-spindle units for multiple operations on fixed setups — plus a full range of accessories. These are powerful, rigidly built machines, designed for easy adjustment and operation. Their 6-spline alloy steel spindles turn smoothly and without deflection on two sets of precision ball bearings. Write for Bulletin 3123.

**The "Q" factor — the built-in Quality which provides trouble-free satisfaction and long life.*

# DRILLING OPERATIONS

**SMALL JOBS UP TO ½"—OR CONTINUOUS PRODUCTION** — The "Buffalo" No. 15 Drill has the adaptability and the stamina for both! Choice of 15 single and multiple spindle models and arrangements, full selection of accessories. Quick, handy adjustments and fatigue-free operation. A full-time production machine, too, with its 6-spline ball bearing spindle and overall husky construction. Write for Bulletin 2963G — there's a "15" tailor-made for your operation!



**BUFFALO FORGE COMPANY**

509 BROADWAY • BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

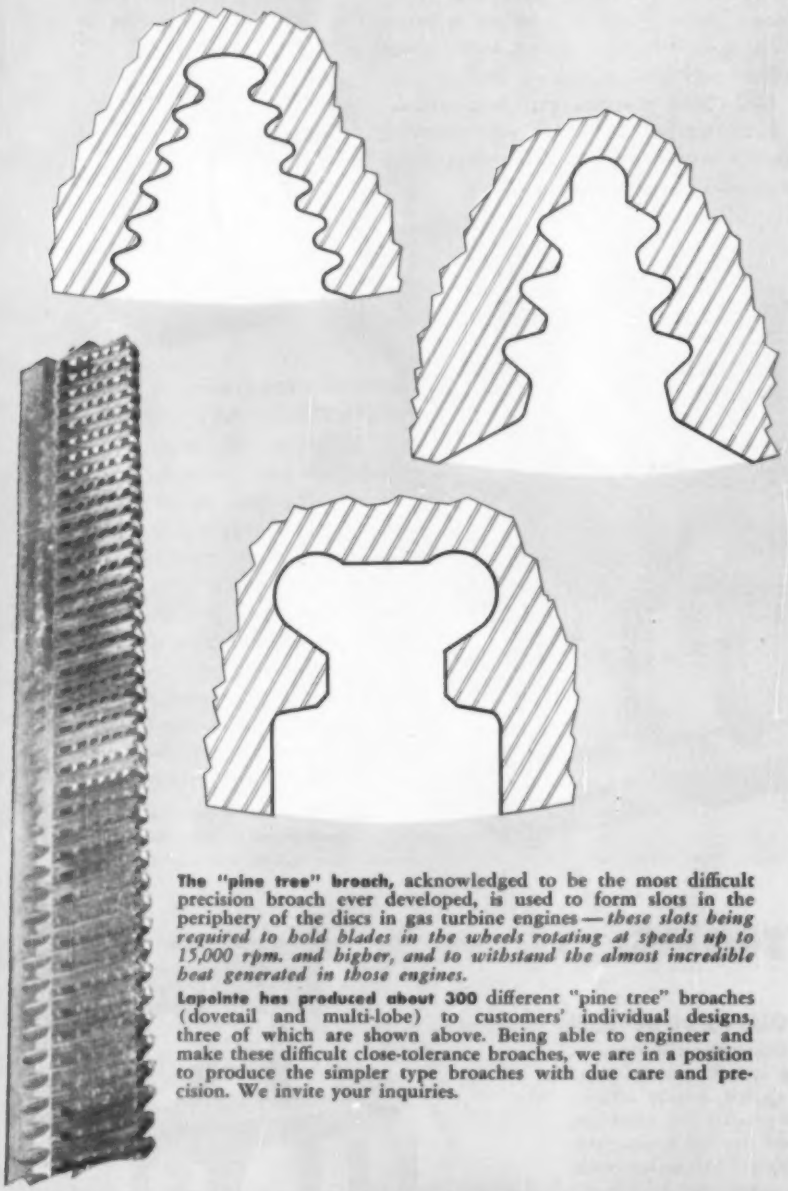
'way back in 1941

(four years before the end of World War II)

LAPOINTE developed the *first*

"pine tree" BROACH

...so that aircraft gas turbine engines could be built in this country.



**The "pine tree" broach,** acknowledged to be the most difficult precision broach ever developed, is used to form slots in the periphery of the discs in gas turbine engines — *these slots being required to hold blades in the wheels rotating at speeds up to 15,000 rpm. and higher, and to withstand the almost incredible heat generated in those engines.*

**Lapointe has produced about 300** different "pine tree" broaches (dovetail and multi-lobe) to customers' individual designs, three of which are shown above. Being able to engineer and make these difficult close-tolerance broaches, we are in a position to produce the simpler type broaches with due care and precision. We invite your inquiries.

LAPOINTE-BROACHES, *Electrolized* increase broach life between grinds from 2 to 10 times.

THE LAPOINTE MACHINE TOOL CO.

HUDSON, MASSACHUSETTS — U. S. A.

In England, Watford, Hertfordshire

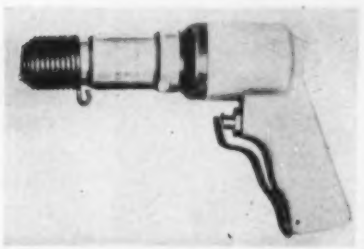
THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

LAPOINTE

known to be the best in

BROACHING

NEW SHOP EQUIPMENT



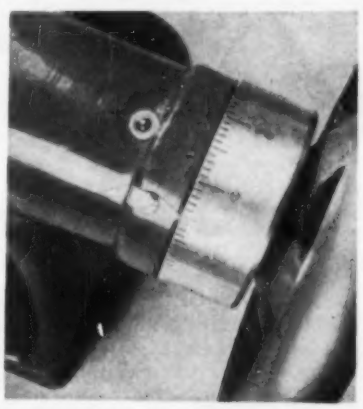
## Air Hammer Tool can be Rotated to Any Position While in Operation

Model HDS-700 air hammer has a beehive-type spring retainer for holding various tools, instead of the customary chuck. Operator can easily rotate cutting tool in any desired direction, while hammer is in use. Hammer weighs 3¼ lb, measures 8 in., and has 3 in. piston stroke. Metering trigger controls hammer blows from 0 to 2700 per min. Eleven chisels are available for hammer.

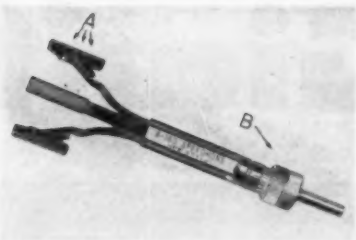
*Superior Pneumatic & Mfg, Inc, 4758 Warner Rd, Cleveland 25, Ohio*

**Aluminum set-up blocks** are soft enough to prevent damage to machine table yet strong enough to withstand heavy weights under clamping pressure. Blocks, mounted on 3-in. risers, hold work from 0 to 3 in. high, and come in sets of 2 multi-step blocks and 2 risers per package.

*Jergens Tool Specialty Co, 712 E 163 St, Cleveland 10, Ohio*



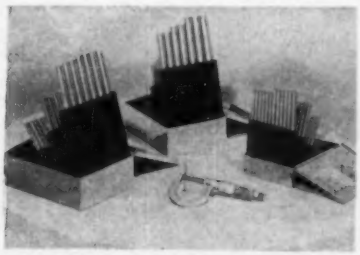
TAIL STOCK DIAL, No. 956, is supplied complete with reference pointer and self-tapping screw. Also available is a cross-slide dial, No. 351, which has colored reference markers for easier reading, and a locking device to hold critical settings. Dials are priced at $12.95 each—*Lloyd Tool Corp, 1620 N Broadway, Burbank, Calif*




### Tool Cleans Grit and Burrs From Taper, Blind, and Straight Bores

Speedhone, with replaceable stones, will not fly apart when pulled from a cylinder while being driven by drill or drillpress. Specially designed hone body provides support for spring arms throughout the honing range—and the three selective pressure positioning holes (A) permit operator to choose the correct pressure. Micrometer tension adjustment (B) increases stone life. Tool is designed for an operating range from 11/16 to 2 in.

*Barrett Equipment Co, 21st and Cass Ave, St Louis 6, Mo*



### HSS Drill Blanks Available in Complete Sets of Standard Sizes

High-speed-steel drill blanks, ranging in size from 0.040 to 0.500 in., are available in three sets. Complete package, including jobber set, letter-size set, and wire-size set, contains 115 pieces in all, and sells for $77.33 complete with cases. Each blank is ground to gage tolerance and mirror finished with a hardness of $R_c$ 64. Sets may also be purchased separately.

*William T Hutchinson Co, 235 Main St, Orange, NJ*

**Germicide,** Winsor G-6, kills bacteria and eliminates unpleasant odors in water-based coolants. Literature showing field test results is available.

*F E Anderson Oil Co, Inc, Portland, Conn*

(Continued on page 216)


# You'll Win on one of these numbers

**A FEW PIECES**
—at Experimental or Pilot Stage

**1**

**SHORT RUNS**

**2**

**PRODUCTION RUNS**

**3**

## And you can't win unless all three are available

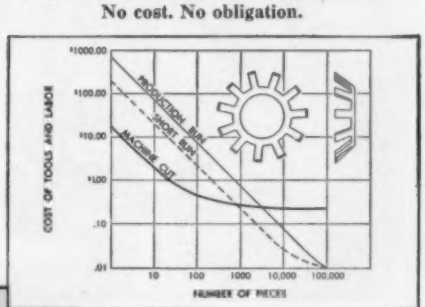
**Our ability to use the *best of three* stamping techniques, each our own exclusive development, assures lowest possible cost on any quantity—one to a million or more.**

**NO DIES!** Our machine cut method, applying custom-built slitters, cutters, saws, files and stock punches—PLUS special techniques and skills—produce these small quantities at very low cost.

**TEMPORARY LOW-COST TOOLING!** To produce something more than a few, but less than high production quantities, our simple contour dies—PLUS special purpose presses—keep costs low.

**MODEST DIE CHARGES** on larger quantities! Here is where our regular production toolings apply to advantage . . . to deliver high quantity Stampings, and at lowest possible unit cost.

**May we quote on your next stampings job? No cost. No obligation.**



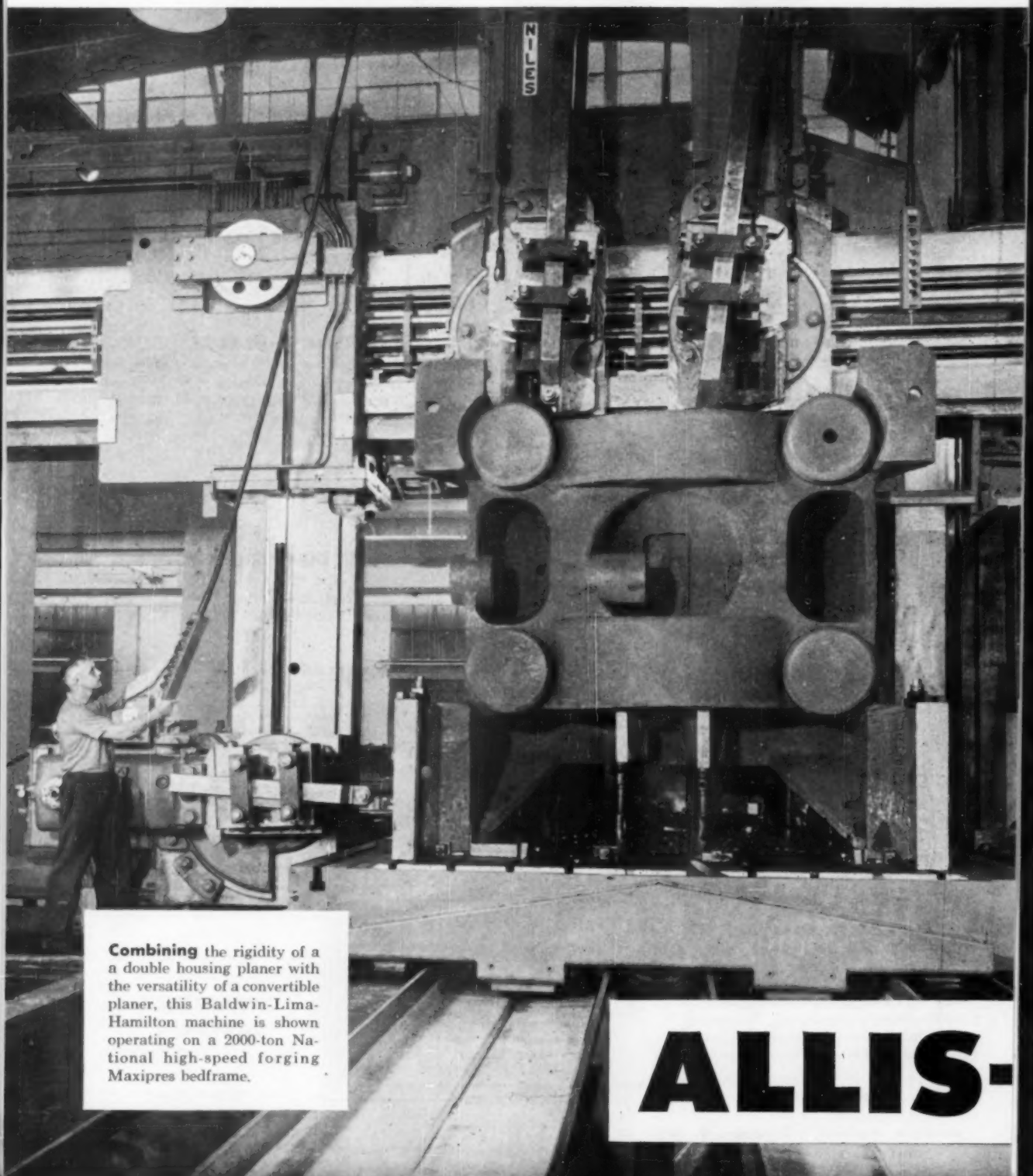

LAMINATED SHIM COMPANY, INC.

*Free 12-page booklet shows how to save on stampings . . . write for it.*

**STAMPINGS DIVISION**

*"One Piece or a Million"*
3109 Union Street
Glenbrook, Conn.

# Allis-Chalmers DC MOTOR and Drive Giant




**Combining** the rigidity of a a double housing planer with the versatility of a convertible planer, this Baldwin-Lima-Hamilton machine is shown operating on a 2000-ton National high-speed forging Maxipres bedframe.

ALLIS-

# CONTROL...

# New Planer

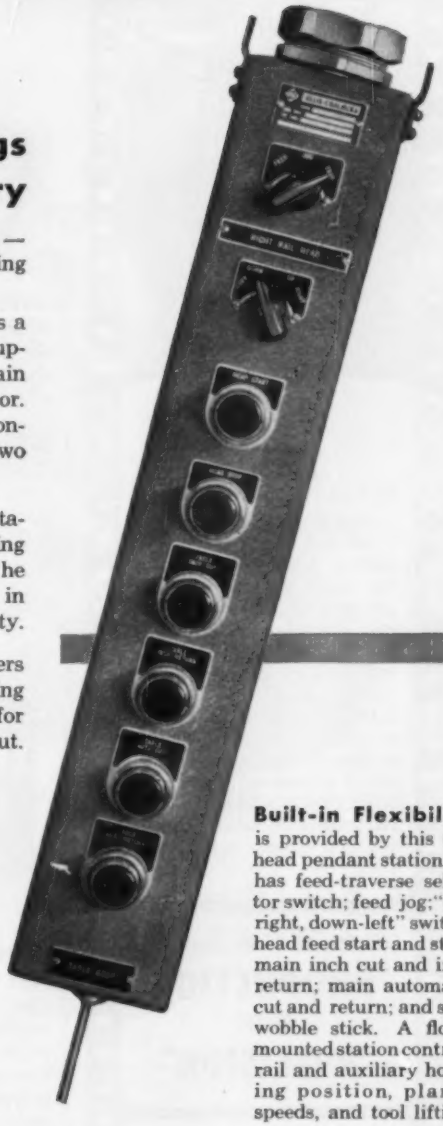
## Baldwin-Lima-Hamilton NILES Planer Handles Flatcar-Size Castings in One Setup at National Machinery

Reduced machining time . . . single setup . . . one-man control — all are advantages of this huge planer which handles any casting within the size dimensions of a railroad flatcar shipment.

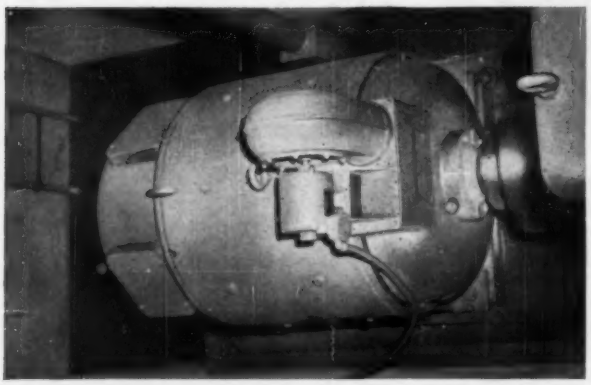
Giving the giant machine maximum flexibility and speed is a specially engineered combination of Allis-Chalmers motors, supporting motor-generator set, *Regulex* exciter, and control. Main power is supplied by a 100-hp, variable-voltage reversing motor. This motor and the auxiliary ac motors are coordinated by controls which can be operated from several locations, including two pendant stations.

**Single-Handed Positioning** — The pendant control stations and other stations permit the operator to position for planing and make all adjustments without help. From one location he may adjust both the left-hand auxiliary housing and planing, in addition to other functions. This gives the machine great flexibility.

**On-the-Job Insurance** — Every part of the Allis-Chalmers drive motors, from long-lasting field coils to thorough ventilating system, is built to eliminate costly shutdowns. It's designed for heavy duty . . . handles extra-tough cuts with no chance of burnout.



**Built-in Flexibility** is provided by this rail head pendant station. It has feed-traverse selector switch; feed jog; "upright, down-left" switch; head feed start and stop; main inch cut and inch return; main automatic cut and return; and stop wobble stick. A floor-mounted station controls rail and auxiliary housing position, planer speeds, and tool lifting.



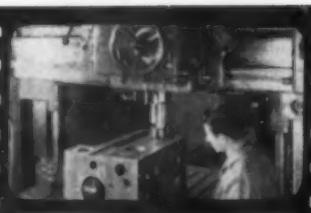
**Sturdy Construction** is a prime feature of this Allis-Chalmers 100-hp, dc drive motor. Located in a deep pit below the planer, its rigid design holds bearing alignment true — keeps grease in, foreign particles out.

**There's a right combination** of Allis-Chalmers motors and control for your application, too. Contact your nearby Allis-Chalmers sales office or write Allis-Chalmers, General Products Division, Milwaukee 1, Wis.

# CHALMERS

A-C ALLIS-CHALMERS

A-5039



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Please arrange, with no obligation, for a free group showing at my plant of your 25 minute, 16mm. sound film, "Production with Precision."

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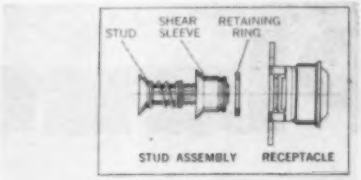
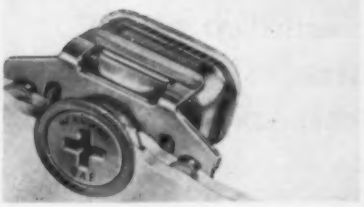
## NEW SHOP EQUIPMENT



**STRESSED-PANEL FASTENER**, designated QAF withstands high shear and tensile loads, locks positively in less than one-half torque-free turn, and compensates for sheet separation resulting from warpage or deformation. It is designed for use in aircraft and missiles, where quick access to service areas is required. It is available for total sheet thicknesses from 0.116 to 0.499 in.—*Waldes Kohinoor, Inc 47-16 Austel Pl, Long Island City 1, NY*

### Wendt-Sonis Roller Turner Tool Cuts to 90° Shoulder

Reported to be the first mechanical toolholder to cut to a 90° shoulder, roller turner toolholder cuts machine downtime to a minimum, because cutting edges can be changed in seconds by unclamping and indexing the carbide insert. Inserts can be indexed to ±0.001 in. so adjustments for depth and length of cut are unnecessary. Tool can be used with 0° lead.

One screw adjustment is used to set the cutting edge on center. Chip breaker can be adjusted quickly when the holder is clamped in the roller turner—an important advantage whenever varying feeds and speeds are used. Catalog 57-A.

*Wendt-Sonis, Hannibal, Mo*

*(Continued on page 219)*

SIP

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has developed from more than 90 years' specialization with practical metrology. The resulting SIP techniques—as used in length measurements by national Bureaus of Standards—may be most profitably applied with SIP UNIVERSAL & LINEAR MEASURING MACHINES, SIP high precision MICRO-INDICATORS, and SIP PROFILE PROJECTORS. How well these techniques and machines can work to your advantage is illustrated in the film offered below.

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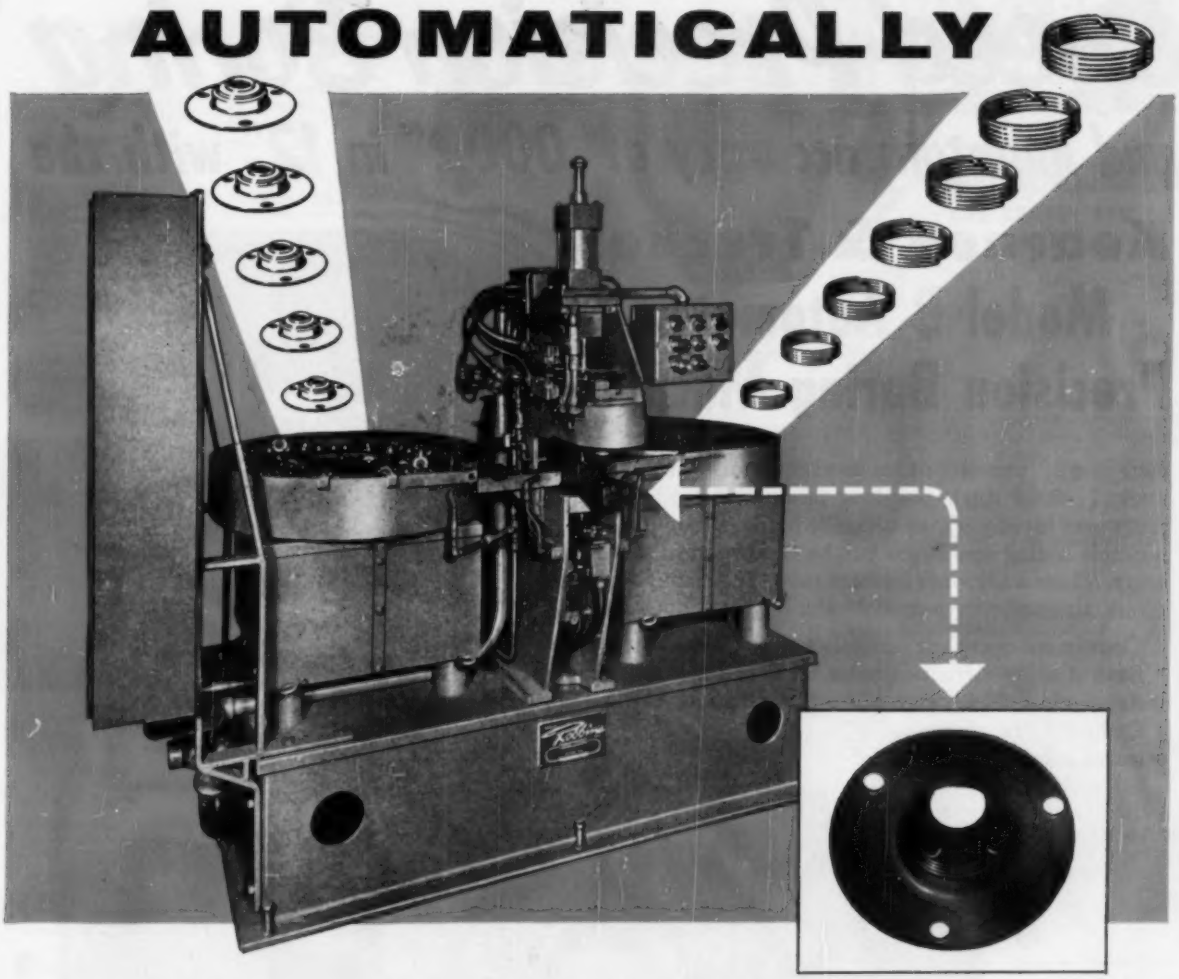
FEEDS, POSITIONS, ASSEMBLES, UNLOADS

# AUTOMATICALLY



## 1,440 INTRICATE SPRING-STAMPING ASSEMBLIES PRODUCED EVERY HOUR!

An automatic machine that installs *coil springs?* Right! . . . it's the new Robbins "Assemblimatic" Twin Feed Special. Two parts, a spring and stamped housing for an automotive window regulator, are hopper-fed into a hat-shaped track . . . housing open side up. The spring is fed over it, compressed and pressed into place. A second ram holds the spring . . . the housing is rotated until spring end is properly located in relation to housing holes . . . the finished assembly is unloaded, *at the rate of 1,440 assemblies per hour at 90% efficiency.*

In addition to completely automatic operation the machine features: electronic production control; automatic lubrication; hardened and ground ways; electrical and pneumatic equipment to J.I.C. standards, and *compactness* . . . the machine measures 82" wide x 38" deep x 70" high and weighs less than 5,000 pounds.

Robbins "Assemblimatic" Machines are, *in fact*, the right answer to a wide range of assembly problems. They have cut manpower requirements, increased production, improved quality, reduced scrap in many mass production operations . . . and, chances are they can do the same for you. Find out now! Call in a Robbins special assembly machine engineer today, or send part prints for detailed recommendations.

*New brochure describes and illustrates a variety of Robbins special assembly machines. Write for your copy today.*

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SPECIAL MACHINES

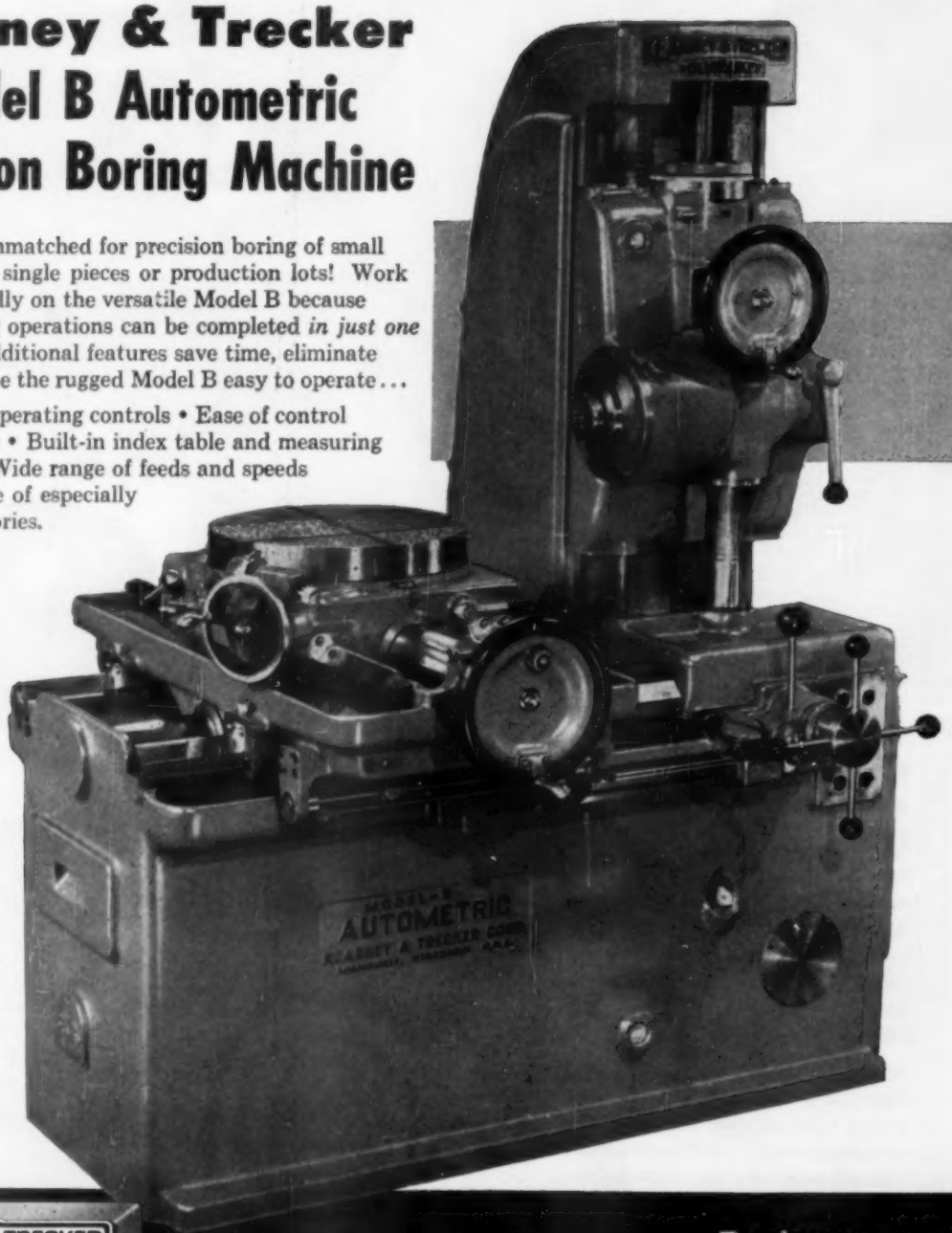
# Speed Precision Boring

## and maintain accuracy of .0002" in 12" with the

## Kearney & Trecker Model B Autometric Precision Boring Machine

Here it is . . . unmatched for precision boring of small work . . . either single pieces or production lots! Work progresses rapidly on the versatile Model B because multiple boring operations can be completed *in just one setup.* These additional features save time, eliminate errors, and make the rugged Model B easy to operate . . .

Convenient operating controls • Ease of control • Ease of setup • Built-in index table and measuring instruments • Wide range of feeds and speeds • Complete line of especially selected accessories.




Model B Autometric: 16" dia. table; 10" Vert. Travel; 16" Transverse Travel; 15" Carriage Travel; 8 speed changes—.0005" to .0148" per Spindle rev.; 50 to 2500 rpm. For complete details, ask for Catalog No. BMA-10.

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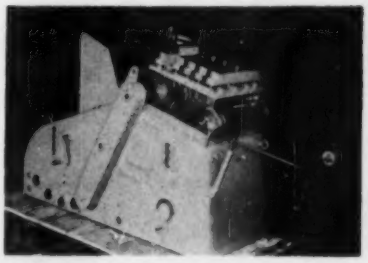
## NEW SHOP EQUIPMENT



### Coil Cradle-Straightener is Added To Line of Press Room Equipment

Combination coil cradle-straightener, Model PDSC-1648, is suitable for material up to 16 in. wide, coils up to 48-in. OD. Cradle is equipped with four power-driven rest rolls, one idler rest roll, and one bumper roll. Straightener has eight straightening rolls (lower four power driven), and two power-driven take-in rolls. Unit features a loop control mechanism, and 3-hp variable-speed motor for speeds from 26 to 76 fpm.

*U S Tool Co, Inc, Ampere (East Orange), NJ*

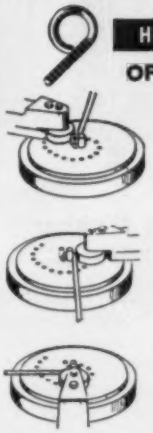
MAGNIFIER is available in four styles —bench model, hand model, with desk or table mounting (illustrated), or with floor stand. All have fluorescent, shadow-free light and a 5-in.-dia lens —*Industrial Products Co, 2844 N Fourth St, Philadelphia 33, Penna*

**Tool tray,** designed for company's 14-in. Precision Model drillpresses, is made of aluminum, and clamps around the 2¾-in. column. It is adjustable to any height or position, either above or below drillpress table. Price is about $6.

*South Bend Lathe Works, South Bend 22, Ind*


**HOW TO BEND BARS and TUBING**

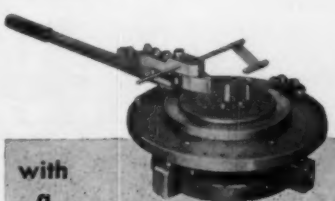
**HOW TO BEND . . . OFF CENTER EYES**



1. Insert bar stock between Locking Pin and Radius Pin of desired size.
2. Set Forming Roller against material and advance Operating Arm.
3. Complete operation with one steady movement.

**HOW TO BEND . . . TUBING**

1. Clamp tube. Insert Follow Block between material and Forming Roller.
2. Advance Operating Arm until it strikes Angle Stop.
3. Remove Follow Block, release clamp and remove tube.



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Complete details on forming rods and tubing with standard accessories as well as tips and technical data on angle, channel and other materials will be found in "It's Easy to Bend", a 32 page summary of Di-Acro Benders and bending. A copy is yours free of charge.

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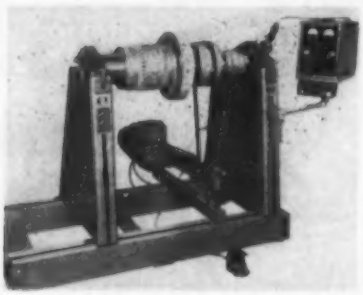
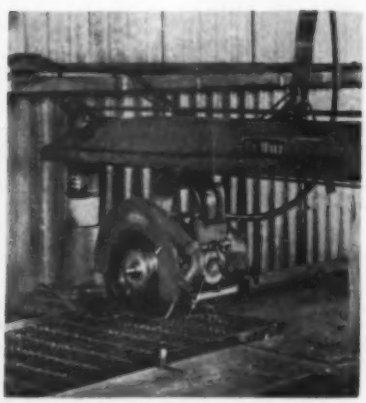


## Dynamic Balancing Machines Detect And Correct Vibration

Multi-purpose dynamic balancing machines, available in three models, are four-way versatile in that they are (1) used for dynamic and single plane balancing of motors, spindles, turbines, impellers, and the like. Yet the electronic console is readily disconnectable for portable use, (2) to check vibration tolerances of assembled machinery, (3) to pinpoint causes and analyze all frequencies of vibrations in assembled machinery, and (4) for inplace or portable balancing.

Angle of unbalance is observed on the workpiece under stroboscopic light. Amount of unbalance is read directly on meter. Rotors weighing 5 to 300 lb are handled on Model 101, from 50 to 1000 lb on the Model 102, and from 250 to 2500 lb on the Model 103. Literature available.

*International Research and Development Corp, 797 Thomas Lane, Columbus, Ohio*



## Heavy-Duty Panel Cutting Machine Does Cross-Cutting, Ripping

Panel cutting machine consists of two vertical columns with a common cross-arm which carries the cutting member. Machine can be used for cross-cutting, bevel-cutting and ripping work on wood, metal, and composition board. Unit is capable of a 62-in. cutoff stroke and is available in models ranging from 3 to 10 hp.

*DeWalt Inc, Lancaster, Penna*

## Self-Feed Air Tool Drills Small Holes Automatically

Midg-A-matic self-feed air drill is 1 in. in diameter and 10 3/16 in. long. It drills holes automatically up to a max size of 1/16 in. Tool operates at 20,000 rpm, has a 1⅜-in. stroke, and has a low air consumption. It can be used singly or in multiples.

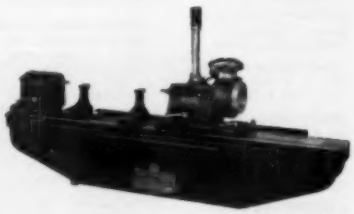
*Aro Equipment Corp, Bryan, Ohio*

AUTOMATIC ROLL MARKER, Series 900, marks end surfaces of production parts during machining cycle on screw machines and other multiple-station machines. Unit attaches to tool mount slides, and can mark flat or angular end surfaces. Standard marking die diameters range from 0.800 to 4½ in. —New Method Steel Stamps, Inc, 149 Jos Campau St, Detroit 7, Mich

(Continued on page 224)

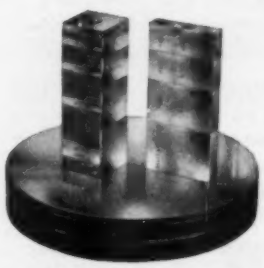
(Advertisement)

*Basic Equipment for Higher Precision*



**P & W STANDARD MEASURING MACHINE**

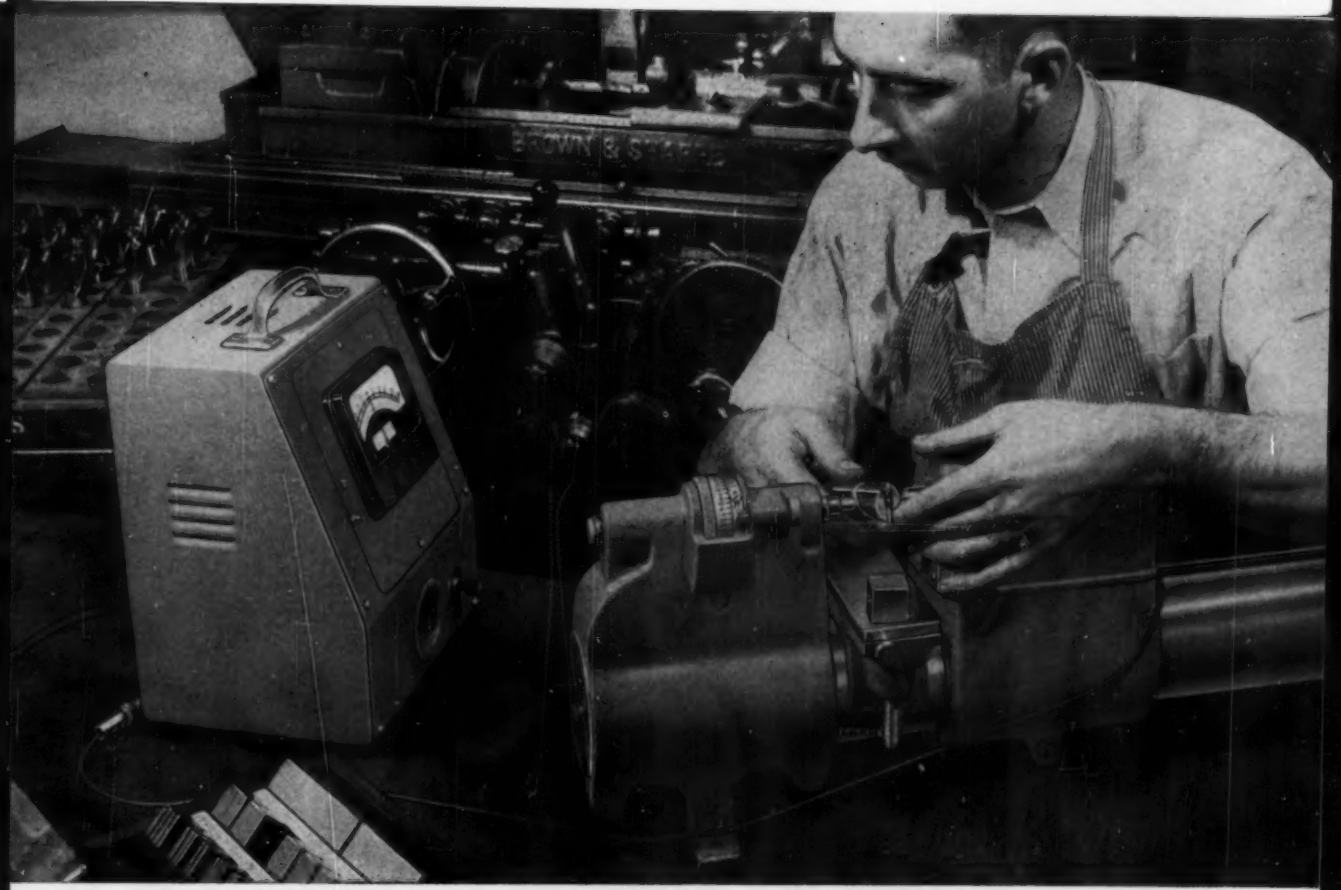
. . . is used throughout industry to measure gages, tools and finished products for diameter, length, roundness, straightness, parallelism and taper direct to .00001" with controlled measuring pressure.



**P & W PRECISION GAGE BLOCKS . . .** are the basic standards of precision in thousands of plants. Guaranteed for size, parallelism and flatness within a few millionths of an inch. HOKE Blocks (square type) and USA Blocks (rectangular type) are available in steel or solid carbide.

**P & W ELECTROLIMIT MILLIONTH COMPARATOR**

. . . was developed by Pratt & Whitney for checking Precision Gage Blocks to a millionth of an inch. An essential item of basic measuring equipment for every plant that must establish and maintain truly high master standards of accuracy.



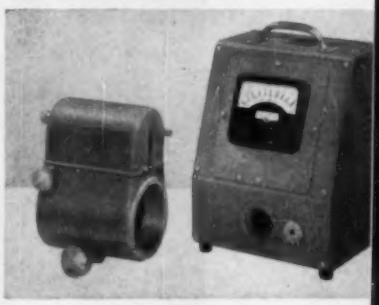
# *More Effective* QUALITY CONTROL *for* HIGH PRECISION PRODUCTION

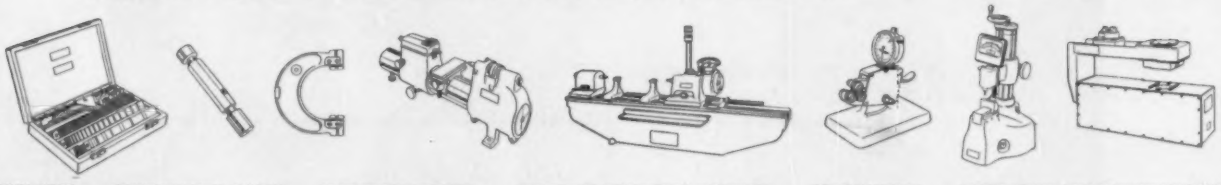
## . . . BECAUSE THE *NEW* P & W *ELECTROLIMIT* SUPERMICROMETER IS *EASIER* TO READ *MORE ACCURATELY!*

Equipped with an Electrolimit Tailstock and a high magnification instrument cabinet, the operator can see *at a glance* exactly how much a part is over or under the required dimension. When used as a comparator, deviations are read directly to .00002" on the meter, which has a full scale of .001". The Supermicrometer is now an even more effective means of eliminating errors and reducing scrap losses from high-precision work. Particularly useful for process and final inspection, the Electrolimit "Supermike" is also ideal for use at the machine on lapping, fine grinding and other precision work.

**CONVERT YOUR OWN SUPERMICROMETER** . . . to an Electrolimit type with packaged unit shown here. Conversion is simply a matter of replacing the old tailstock with the new Electrolimit type.

Write now for complete information about the new P & W Electrolimit Supermicrometer or the Electrolimit Conversion Package. Pratt & Whitney Company, Incorporated, 11 Charter Oak Boulevard, West Hartford, Conn.





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MACHINE TOOLS • GAGES • CUTTING TOOLS

*Correct Lubrication in Action . .*

# Lubricant Cost

Giddings & Lewis is one of the world's largest builders of high-power, precision machine tools. Shown in drawing is 10' Hypro Vertical Boring Mill. Entire G & L and Hypro division is protected by Socony Mobil Program of Correct Lubrication.

Mobil **SOCONY MOBIL**

*Leader in Lubrication for over 91 years*

*in the* **Machine Tool Industry**

# Per Machine Cut 18%

**One of many ways Giddings & Lewis Machine Tool Company has increased profits with the help of Socony Mobil**

To Giddings & Lewis, one of the most direct ways to increase net profits is to reduce maintenance costs. That's why this company, a leading builder of quality, high-precision machine tools, relies on a Mobil Program of Correct Lubrication.

In just three years a Mobil "team" of lubrication specialists, working closely with plant personnel, cut lubricant costs per machine 17.9% . . . reduced lubricant application cost 7.6%.

These savings were but a few of the many and varied cost-cuts achieved through Mobil products and Mobil service. They reflect the many hours spent by Socony Mobil field and laboratory personnel in studying machine operations, preparing technical reports, making analyses of products in use.

Why not rely on a Mobil *Program of Correct Lubrication* to help *you* improve production and reduce maintenance costs?

**Can you afford to accept less than a cost-cutting service like this?**

After a Mobil representative makes a lubrication analysis of your plant, a program of Correct Lubrication is put into action. Described below are some of the features of this program and how they benefited Giddings & Lewis.

*Lubrication specialists,* the most experienced in the petroleum industry, are ready to help you solve the knottiest lubrication problem. **For example, a Mobil engineer helped G & L solve a problem of repeated bearing failures on shop planers. His lubricant recommendation eliminated the trouble . . . saved $244 a year on each planer.**

*Constant Quality Checks* are kept on Mobil lubricants in use. Socony Mobil offers more analytical service than any other oil company. As a result, you can *safely* get maximum life from every Mobil product. **At the G & L and Hypro division Mobil quality oils are repeatedly filtered and put back to work. Periodic checks by Mobil laboratory analyses show oils to be in "like new" condition even after years of service.**

*Thorough knowledge of machine design*—Mobil engineers work closely with designers and builders . . . advise on hydraulic and lubrication system design . . . suggest the correct products for each machine. **G & L affixes a lubrication plate to every machine they produce. It specifies the use of the right Mobil product (or equivalent quality) to assure satisfactory operation wherever these machines are used.**

*In-plant training clinics* are conducted by Mobil engineers. Maintenance personnel are instructed in proper application procedures . . . taught to recognize trouble before it occurs. **At G & L, frequent electric motor failures were found to be caused by over-application of grease. Instruction corrected this trouble . . . reduced application time by 66% . . . cut grease consumption, too.**

*Correct Lubrication*

**A proved program to reduce maintenance costs**

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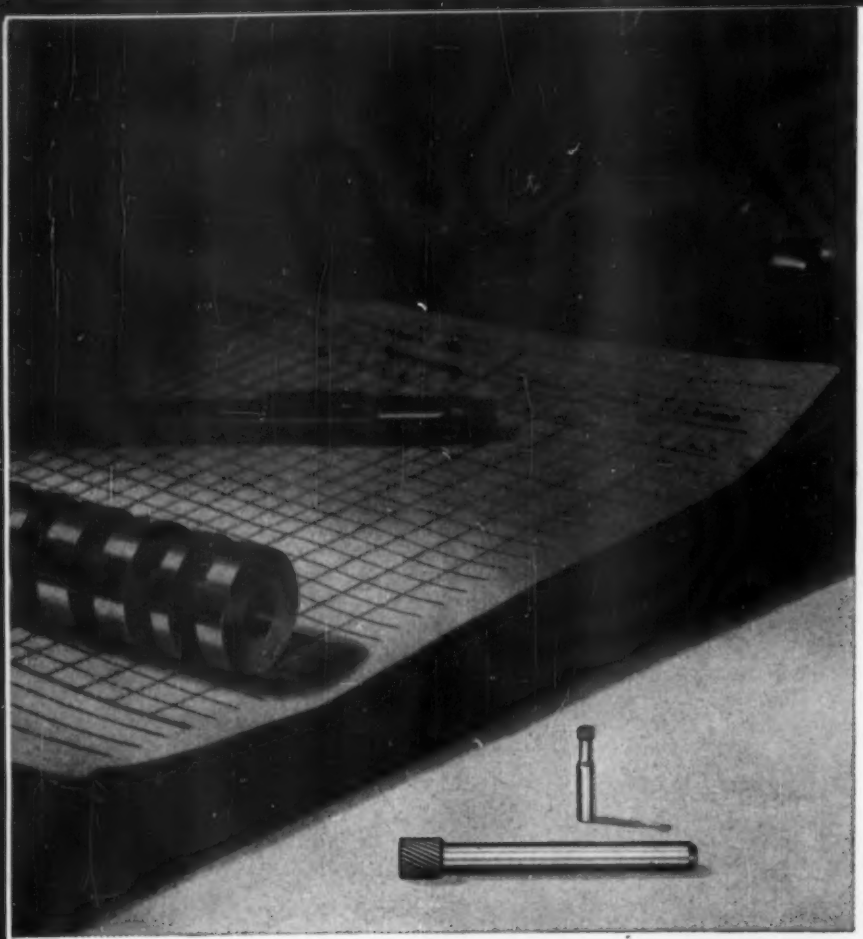

*Figures Prove*
*They Last 3 Times Longer!*

When it comes to finishing small holes — down to .032" diameter — P&W Kellerflex Carbide Hole Finishing Burs have proved on job after job that they will consistently *outlast and outperform* all other finishing methods and competitive burs. On one recent job, P&W Burs lasted more than 3 times longer than the next best. On another, they delivered up to 5000 pieces per bur. In addition, P&W Burs speed up production . . . machining time is as little as 30 seconds per piece. Accuracy and finish are improved . . . work has consistently been held to .0002" for size, .00005" for roundness, and 4 micro-inches for finish! The fast-growing miniaturization market can mean BIG profits from small parts, and P&W Carbide Burs finishing small holes can help you get your share.

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. . . THREAD ROLLING DIES • DUOCONE DIES • TAPS • THREAD MILLING CUTTERS • REAMERS . . .

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*FIRST CHOICE FOR ACCURACY*
MACHINE TOOLS • GAGES • CUTTING TOOLS

## NEW SHOP EQUIPMENT

### Plane Surface Calibrator

New model Planekator locates a theoretically perfect plane over the surface plate. Indicator readings are then taken between the perfect plane and the surface plate and recorded on a chart.

Instrument has an indicator base which will take any indicator made to American Gage Design AD2 dimensions; several are available, graduated in 0.00005 in. Estimating 1/5 of a graduation makes it possible to calibrate a surface to 10 millionths.

*Rahn Granite Surface Plate Co, 644 N Western Ave, Dayton, Ohio*

**Line of industrial ac motors,** designated Life-Line A, has been extended to include ratings from 40 to 125 hp. Frame sizes include all NEMA designations from 364U to 445US, conforming to new NEMA standard dimensions. Three enclosures are available: totally enclosed fan-cooled, enclosed nonventilated, and drip-proof.

*Westinghouse Electric Corp, PO Box 2099, Pittsburgh 30, Penna*

**CRIMPING TOOL, called Crimcut, is a combination crimping tool, bolt cutter, wire cutter, insulation stripper. It enables anyone to attach solderless terminals quickly and easily, shears bolts from 4-40 to 10-24 without marring threads and strips wire from No. 10 down to No. 22. Price of this 8-in.-long tool is $3.95—*Vaco Products Co, 317 E Ontario St, Chicago 11, Ill***

## Round Table

### WHO BUYS THE TOOLS?

*Should the company be responsible for all tools, including those owned by the workers? Is it the company's responsibility to replace stolen tools, if the theft takes place in the shop?*

WHO BUYS the small tools used by mechanics and inspectors? This is a problem for management. It is thus a question to which there is no categorical answer.

Industrial management is not a science. It is not a profession. It is a practice. Good practice is that which produces good results. Any answer which produces the desired results is the right answer for the moment. There is more than one way to skin a cat.

The easiest way to answer an industrial question is to analyze management. Management is a servant. It serves the owners of an enterprise. An enterprise also serves. It serves the material needs of society. It does so by employing men to process material to yield a quality product at a price the public can afford to pay when the public needs that product.

There is another interesting objective requirement of this economic activity, namely profit. Profit is not an end in itself. It is, from empirical knowledge, an essential to an enterpriser's effort to produce more goods for more people at less cost. It is a disciplinary factor in getting the right answer to many managerial problems.

Let's say a few more things about

*He's doing the job*
*FASTER and CLEANER*

**...BECAUSE P&W KELLERFLEX® BURS are MASTER MACHINE GROUND**

Precision in every respect, they cut faster and smoother without chatter or bounce and deliver an overall performance efficiency that *no* hand ground bur can possibly match. All P&W Burs of the same size and shape are exact *duplicates* . . . have *identical* cutting characteristics. And you can select the *right* bur for all your jobs from the complete P&W Kellerflex line that includes: high speed steel or solid carbide types, 3 basic cuts, 4 shank sizes, 6 types of master ground fluting and 18 standard shapes (plus hundreds of specials). Available from stock at the P&W Branch Office near you.

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Availability of Sintered Powdered Metal Bearings and machine parts from a fully competent and technically responsible source opens the way to improvements in mechanical products.

Bunting facilities for designing, engineering and manufacturing of Sintered Powdered Metal Bearings and parts are as comprehensive and responsible as the traditional Bunting competence in the field of Cast Bronze Bearings.

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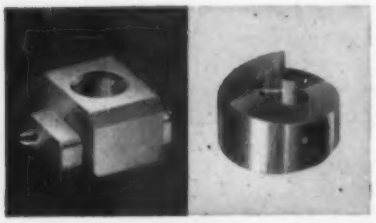

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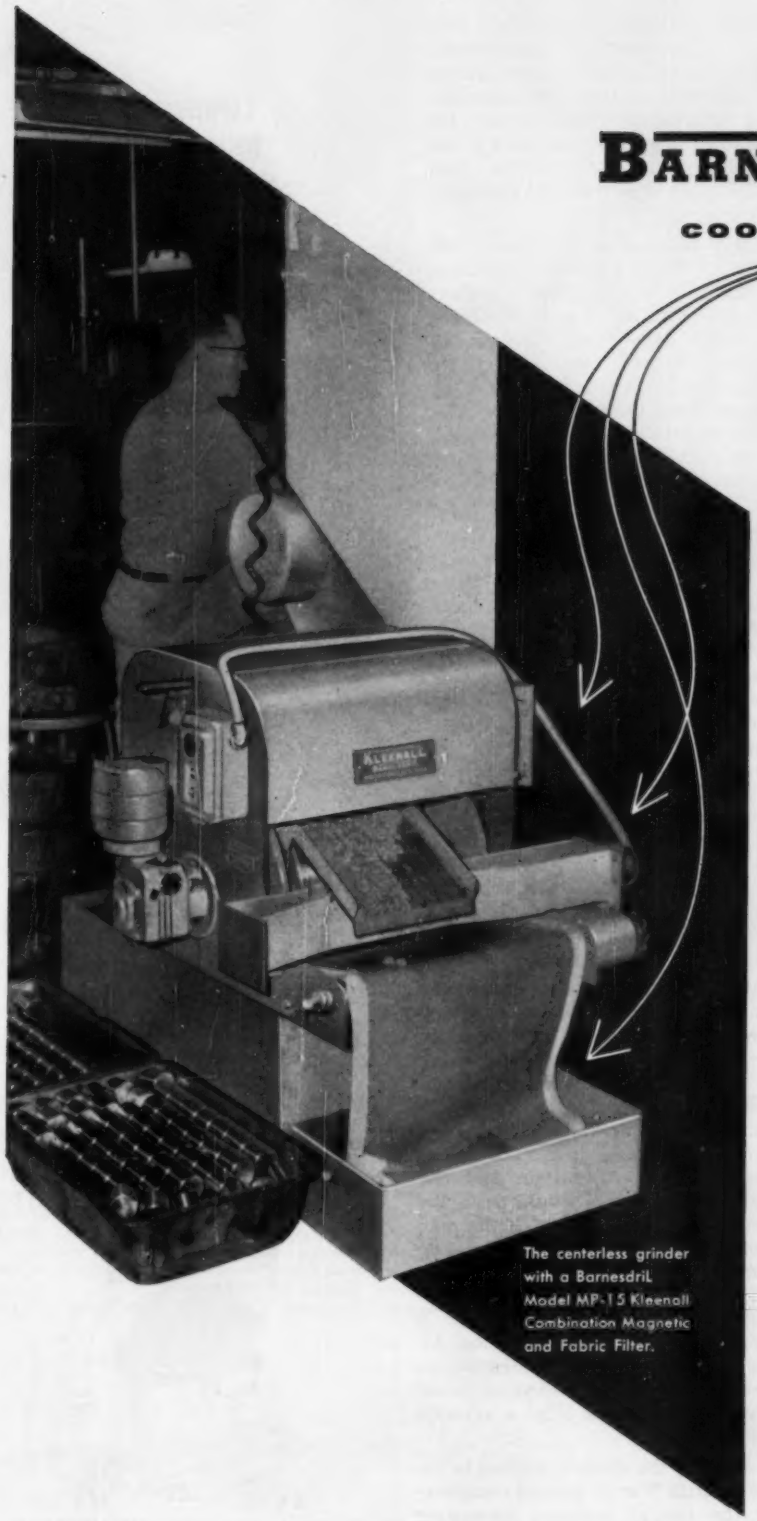
profit before using it as a measuring stick to answer the question as to who buys the tools. It is good economics, good citizenship, and good living to produce a quality product at low cost on schedule at a profit. It is an economic misdemeanor to produce a quality product at low cost on schedule without a profit. The economic life of such a servant is limited. He jeopardizes the life of good economic servants. It is an economic misdemeanor to produce a low quality product at any cost when it will sell at a profit. Such a policy cause society to lose faith in their economic servants.

To produce a quality product at low cost on schedule workers must have the proper tools at the proper time in the proper place. This applies to those small tools used by mechanics and inspectors. Such a policy facilitates quality control, cost control, production control, and employee morale.

A manager's answer to a question is often evasive, flexible, subject to mediate or immediate change. It is not a manager's job to draw firm conclusions. They must motivate people, stir 'em up, get 'em going. Workers governed by emotions, prejudices, and provincial idiosyncrasies are not moved by the coldly logical appeal. There is no categorical answer to the simplest of industrial problems.

The management of a successful competitive enterprise may buy all the small tools in the shop. An equally successful competitor may pursue the opposite course. So, what are we

*"No, it don't give me no trouble—it don't dare!"*



The centerless grinder with a BarnesdriL Model MP-15 Kleenall Combination Magnetic and Fabric Filter.

# BARNESDRIL

## coolant filters

## provide competitive quality advantage

"Savings are secondary to the quality control we have gained in the use of BarnesdriL Kleenall Filters. The Filters have allowed us to keep ahead of our competition in the quality of our product."

This statement was made by the plant superintendent of a prominent roller bearing manufacturer. A centerless grinder (shown) and a super finisher are used for surface finishing and bringing bearings to their final accuracies. Both are equipped with BarnesdriL Kleenall Combination Magnetic and Fabric Coolant Filters. The bearings, used in guided missiles, aviation electrical motors, and transportation equipment, are finished to 2 to 3 RMS micro-inches. Size must be held to ±.000025", and their crowns held to .00001", checked by electronic measuring device.

By filtering the recirculated coolant through Kleenall Filters, definite production savings are also accrued. Less coolant and less labor are required and equipment lasts longer. If quality control or extreme accuracies are part of your production requirements, consult a BarnesdriL Engineer about the advantages of Kleenall Filters.

50th year

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830 CHESTNUT STREET • ROCKFORD, ILLINOIS
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going to do? Fortunately, or unfortunately, I'm not a manager. I'll make a categorical statement, try to prove it, and attempt to refute the main argument against it.

The company should buy the tools. The owner of the tools controls the tools. Control is the power to have the right tool in the right place at the right time. This facilitates quality, cost and production control. Such control enhances one's competitive position.

One may claim that when a mechanic or inspector owns his tools he will take better care of them. Such does not prove to be the case from my experience. Tool care requires time and effort. It requires discipline. It is more difficult for a workman to discipline himself than to be disciplined by others.

In a comparatively large and busy shop more profit can be made when the company supplies the tools. Profit, that horrid word, is still the best criterion for measuring one's ability to serve the public.

Peter A Seward
*Swampscott, Mass*

## WHO BUYS THE TOOLS?

UP TO 1936 I had worked for about 15 different machine shops situated in various parts of the world and my personal tool kit contained nothing more expensive than a surface gage. Journeymen machinists, like myself, managed pretty well with a few pairs of calipers of our own and relied for precision measuring instruments on the tool stores of the various companies where we happened to be working. Up to 1936 I never met a workman who owned a micrometer or any other expensive tool or measuring instrument; the unspoken argument was that if the company wanted precision they would have to provide the necessary instruments.

Ideas about precision varied with different firms. In one organization we built locomotives almost without any drawings and it was a matter of calipering an existing hole in a locomotive side frame in order to turn a pin to fit it; a fine sense of touch was required in calipering a hole in order to turn a pin which would be sliding fit, particularly when the hole was nearly a quarter of a mile from the lathe on which the pin was turned.

In shops where some degree of interchangeability was required, it was usual to have a full set of micrometers and any other tools needed for measuring diameters. When a machinist required it, a micrometer was obtained from the tool stores and the machinist was required to sign a chit as a receipt for the tool. I do not recall any tools being stolen or misplaced. In fact, the only theft I ever encountered was that of a 1-in. micrometer which happened to be the treasured possession of one of the men. It was never recovered, but it certainly created a rumpus in the organization because nothing like it had ever happened before.

I don't know whether men were more honest 20 years ago than they are now, but we were certainly free of a lot of the petty pilfering which is suffered nowadays as a normal industrial hazard. At that period, a 2-in. micrometer represented about one week's wages to a man in the northern part of Britain and the theft of such a tool would be in the nature of grand larceny. If the man stole the micrometer, it would not do him any good. He couldn't use it in his own shop; a personal 2-in. micrometer was so unusual that it would instantly create suspicion. Also, he would have no idea where he could sell it for cash and no pawnshop would regard it as a saleable item.

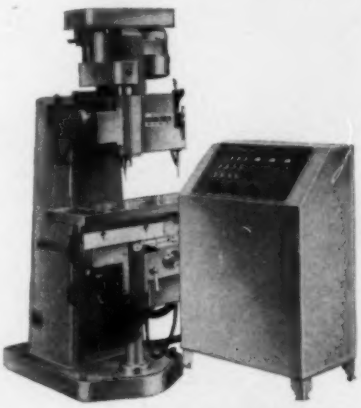
Some of the shops I worked in before World War II banned completely the use of personal measuring instruments and required employees to use the company property. The product demanded accuracy and interchangeability and all measuring instruments were checked carefully

*(Continued on page 232)*

*"Crudwick's trying to figure out what's happened to "think!"*

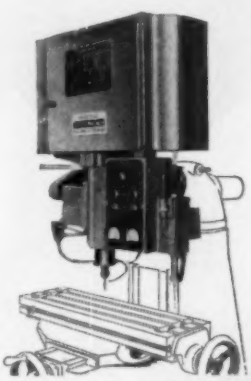
*(Advertisement)*

**REPRODUCE WITHOUT TOUCHING THE MODEL — WITH PRATT & WHITNEY VELVETRACE EQUIPMENT**

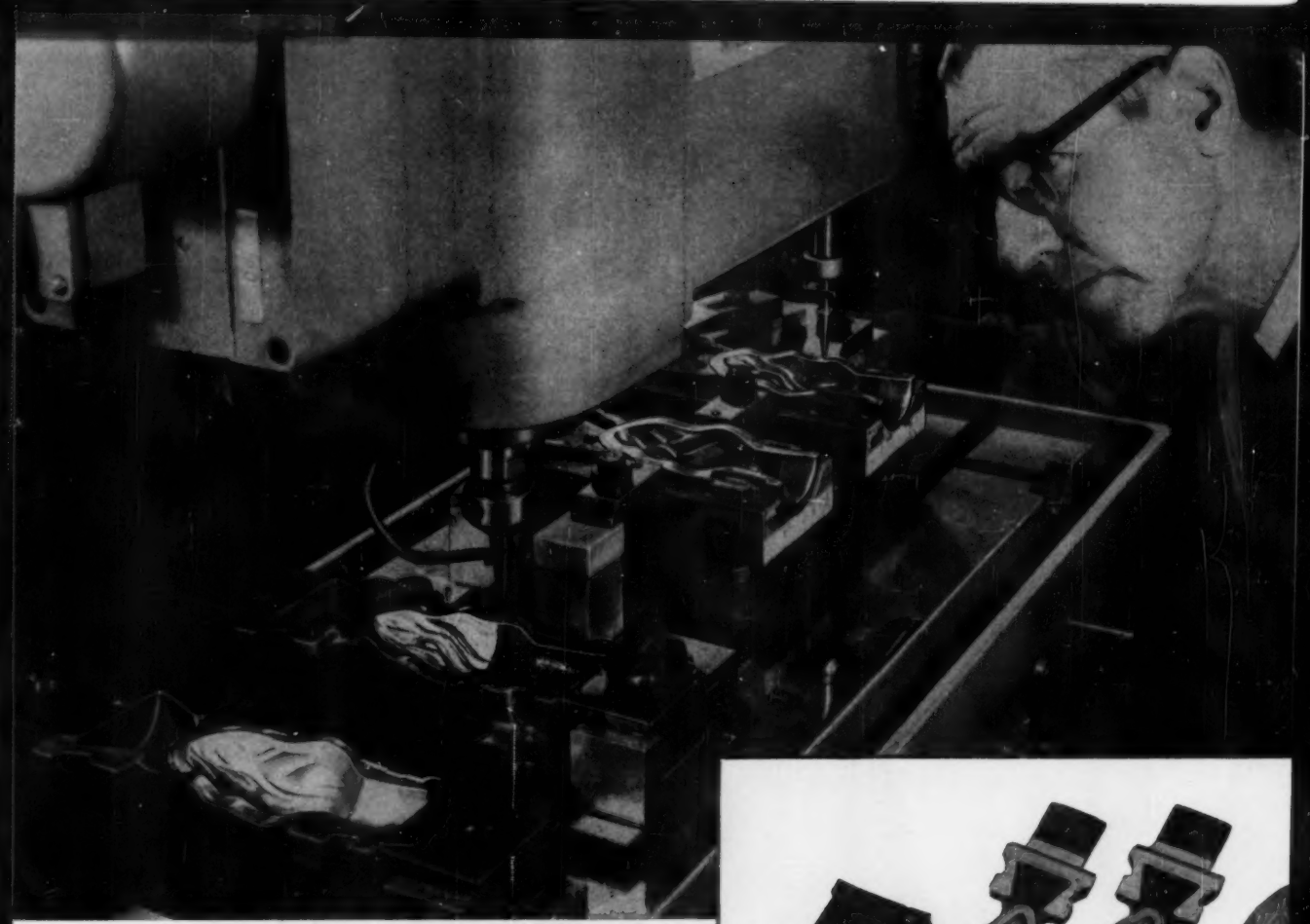


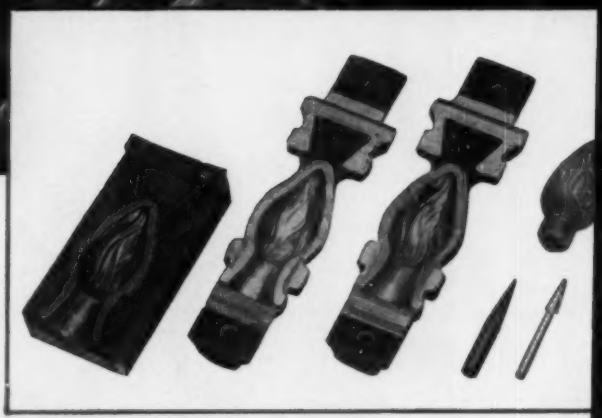
**VELVETRACE® MILLING MACHINE . . .**
Ultimate in accuracy for 3-dimensional tracer-controlled reproduction. Spindle speeds from 310 to 10,800 rpm. Work size capacity 9" x 12".

**THE VELVETRACE DUPLEX ROTARY FIXTURE . . .**
is easily mounted on the table of the Velvetrace Milling Machine. Offers faster setup and machining, and more desirable feed patterns, for milling a variety of linear or circular work.



**VELVETRACE MILLING ATTACHMENT . . .**
a complete, easily attached unit that brings the outstanding advantages of Velvetrace 3-dimensional tracer control to most conventional milling machines.





# *Putting* PRECISION REPRODUCTION *in a New Light*

**BECAUSE THE PRATT & WHITNEY "VELVETRACE"® MACHINE DUPLICATES THE FINEST DETAIL WITHOUT TOUCHING THE MODEL . . .**

These flame-shaped light bulb molds, produced for Corning Glass Works, were machined with such fine detail on the Velvetrace that no hand finishing was required.
Ideal for your die, mold, prototype and other work, the Velvetrace employs a unique *non-contacting* tracer control that follows any 3-dimensional model without touching it . . . cannot damage your model, however soft or fragile, even when using the smallest diameter tracer points. Fully automatic operation with variable speed control to compensate for changes in contour, and a wide range of spindle speeds from 310 to 10,800 rpm insures you fast, economical production.

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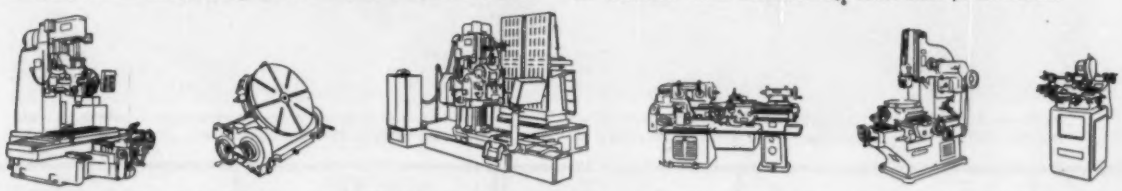

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*FIRST CHOICE FOR ACCURACY*

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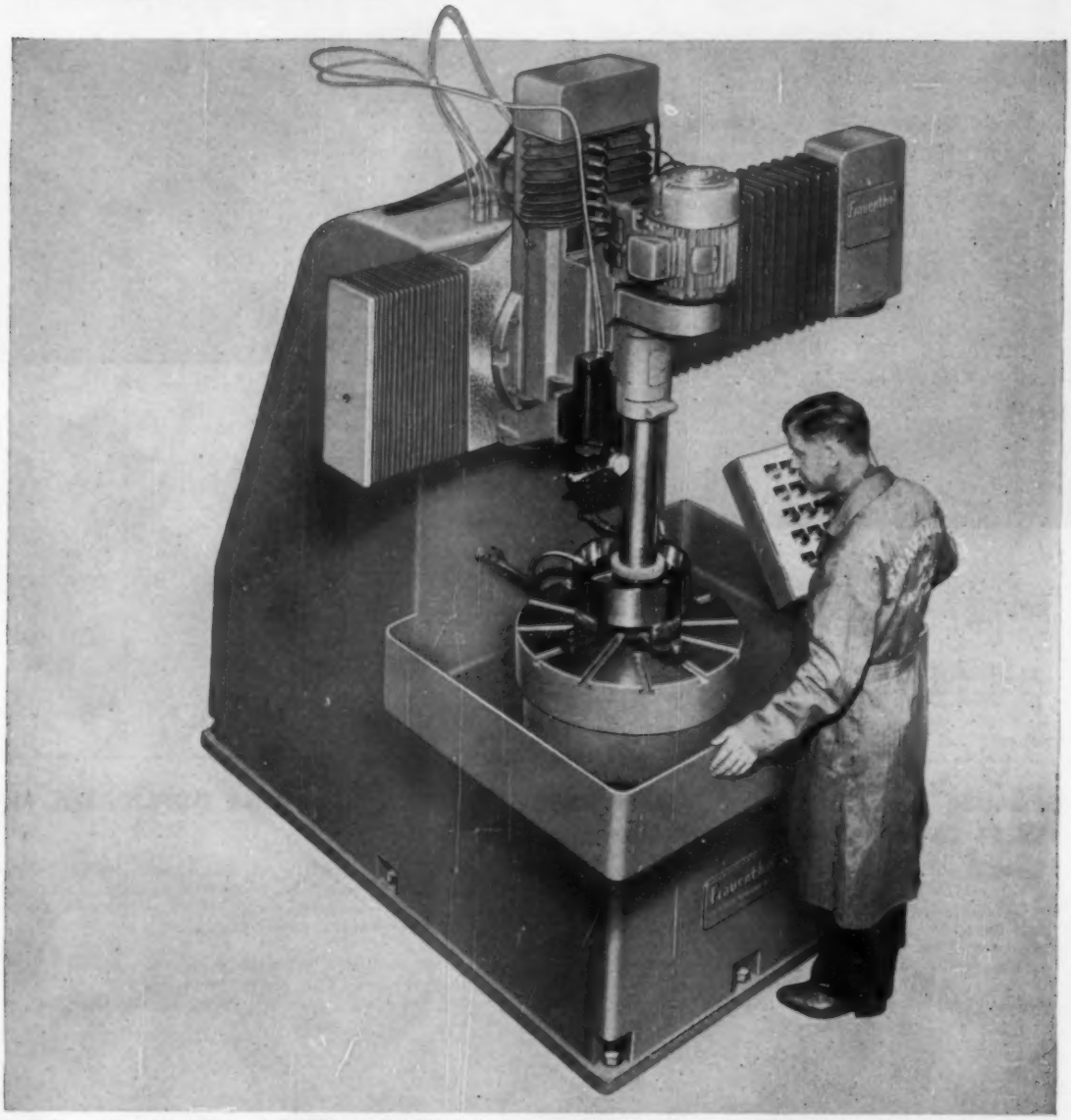
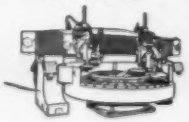
# NEW Frauenthal 1200 Series single spindle vertical precision grinders



Bird's-eye view of a new Frauenthal 1200 Series (belt-driven) single spindle, vertical precision grinder. These versatile machines are designed to meet a broad range of present requirements . . . are readily adaptable to future requirements.

**F** PRECISION PRODUCTION VERSATILITY

2200 Series
72-150" Swing

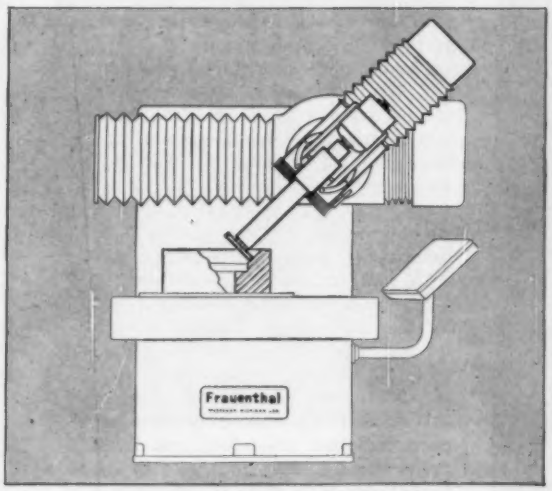


1800 Series
60-72-84" Swing

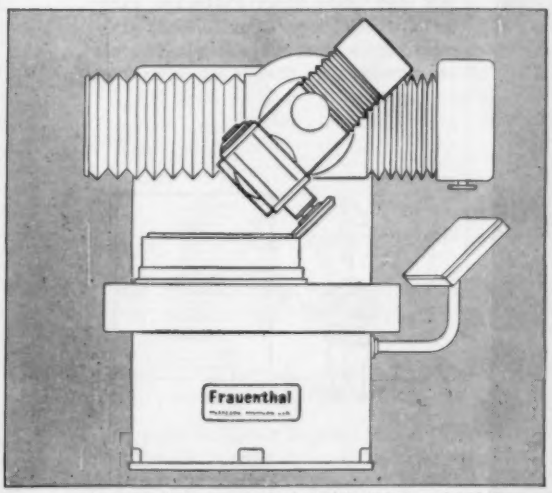
3100 Series
60-72-84" Swing

# creatively engineered

## ...accuracy to .000100" at spindle nose




Frauenthal belt-driven Model 1224B and 1236B single spindle, vertical precision grinders have an extreme angle setting of compound at 45°. Versatility such as this permits angle, internal, external and face grinding to millionths-of-an-inch related tolerances.




Frauenthal direct-connected Models 1224D and 1236D are ideal for rotary surface grinding, O.D. surface and angular approach grinding operations. A variety of grinding spindle positions is possible with this head arrangement.

## assures uniform, super-precision part after part!

*Super-precision* is the natural result of overall Frauenthal single spindle, vertical precision grinder rigidity; of proven performance . . . and *continuous* application of advanced grinding techniques.

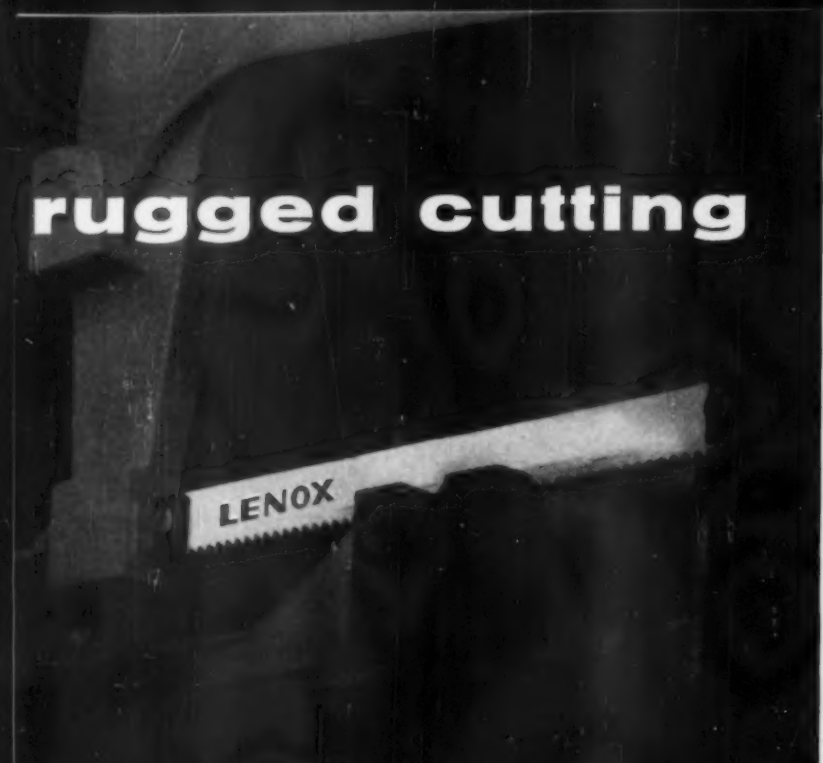
These new Frauenthal 1200 Series machines are available with choice of belt-driven or direct-connected grinding spindles. Machines with either spindle arrangement are offered with 24" dia. tables x 36" swing and 36" dia. tables x 48" swing capacities inside splash guards. Additional swing can be obtained by removing guards.

*Write for free Bulletin*

1200 Series
36-48" Swing

Special Grinding Machines using standard Slide Units

**Frauenthal Division**
THE KAYDON ENGINEERING CORP.
MUSKEGON, MICHIGAN, U. S. A.




...WITH LENOX MO-SPEED® POWER HACK SAW BLADES

Here is a power hack saw blade that can take it! Power-packed steel, tough-wearing teeth, and straight-cutting performance gives you increased production rates with minute tolerances.

Made of the finest high-speed steel, the LENOX Mo-Speed bites into the toughest materials, takes full-rounded chips, eats through hard spots. You'll spend less time changing blades, get straighter cuts, and boost cutting records when you switch to Mo-Speed.

There are three types of LENOX power blades designed to fit your particular cutting needs. Call or write today for full information.

LENOX
THE TOOLS IN THE PLAID BOX

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against standards by the inspection department who controlled the issue of tools.

In some general engineering shops, inspection was a function of the fitting and erecting section and in one place the foreman fitter issued measuring instruments and checked them against standards before issuing them to the machinists. In these small (and large) shops, the close control over the movement of expensive tools and measuring instruments was fostered by the workmen, who had worked there for long periods.

I had to gather together a personal tool kit in the early part of the war when I went to work in a toolroom which operated a bonus system. Expenditure of money on personal measuring instruments and other small tools was essential if a man was to make anything above bare time rates of pay. The company made such expenditure a necessity since the measuring instruments provided by the stores were limited in supply and were extremely unreliable through lack of maintenance. Personal tool kits of most of the men in the toolroom were extensive and even included taps, dies, and twist drills. By avoiding journeys to the tool stores, they were able to reduce the time taken on their work and increase their profit. Theft of tools was not apparent since the machinists had good quality storage cabinets which they kept locked; they also kept a close watch on their tools in current use. It was an unwritten

*"No more for me, thanks . . . I've had too much. I'm really overloaded."*

# only Vlier HEXNOSE spring plungers can be installed with an ordinary end wrench!

*Hexagonal nose eliminates need for spanner-type wrenches; speeds insertion, adjustment and removal!*

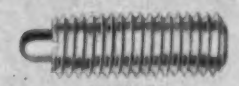
PATENT NO. 2,791,814

Whatever your spring plunger application—tooling or original equipment—you'll like the ease and speed with which Vlier Hexnose Spring Plungers can be installed.

No more hunting for clumsy-to-use spanner-type wrenches or special screw drivers—any ordinary end, socket or crescent-type wrench will do the job quickly and easily.

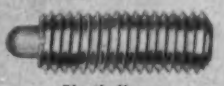
Since the plunger nose is always easily accessible, the Hexnose really pays off where periodic adjustments must be made. Hardening both body and plunger assures body life. Available in both standard and light end pressure models; 11 sizes.

**THERE'S A VLIER SPRING PLUNGER FOR ALMOST EVERY CONTROLLED-END-PRESSURE APPLICATION!**



**Standard**
Primarily used in ordinary jigs and fixtures.

**Silvernose**
Light end pressure for repetitive die applications.



**Plastic Nose**
For use with aluminum, brass and other soft materials.



**Hexnose**
For greater ease in installing, adjusting and removing.

***Same sturdy construction as other Vlier spring plungers***

1. Large bearing surface overcomes binding, assures perfect alignment of the plunger at any extension.
2. Concentricity between plunger axis and body diameter held to .0015" T.I.P.R.
3. Rust-proof finish and National Coarse Class 2A threads prevent freezing in threaded hole.
4. Plunger end telescopes completely within body. Case-hardening assures extreme wear resistance. Ductile core overcomes brittleness and hazards of fracturing under impact, common with hardened, high carbon steels.
5. Spring pressures are accurate, uniform and dependable.
6. Accurately radiused nose speeds loading and unloading of jigs and fixtures.

Send for your 1957 Vlier catalog.

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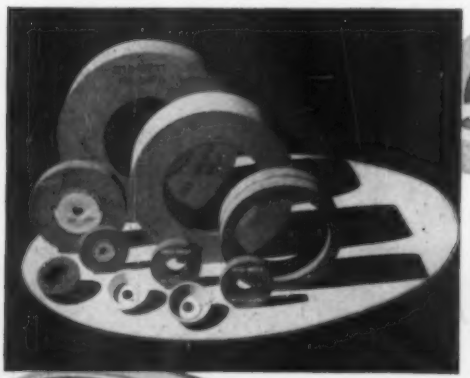
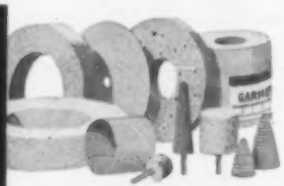
# There is a difference





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and progressive thinking makes the difference

MID-WEST QUALITY ABRASIVES

MID-WEST ABRASIVE CO.
510 S. Washington St., Owosso, Mich.


law in this shop that tool borrowing and loaning was to be deplored; the attitude was that a machinist invested money in personal tools to increase his bonus earnings and other machinists should be expected to do the same.

I think that managements should take some responsibility for personal tool thefts which happen in their works because one of the reasons why personal tools are needed is because they are too tight-fisted to provide an adequate supply. The lack of small tools in some firms is chronic and the situation seems to be getting worse. If a man has to provide his own equipment in order to do his work, then he should be protected against the petty thieves which are sometimes engaged by his employers.

One solution to the problem is for the management to provide a free tool-marking service to employees who can have their equipment engraved with their names in a proper manner. Names should be engraved by means of an engraving machine so that a good depth of impression is obtained without damage to the tool. The best tool marking legend is "Stolen from Joe Blow;" this has the effect of making tools red hot.

Clifford T Bower
*London, England*

## PAYOFF ON THE SLY

*Is it possible to give a man a special raise for work unusually well done, a raise outside of regular routine increases? If it is done, should it be kept secret, or made public?*

IT HAS been my experience, in and out of the machine shop, that anything done on the sly is sooner or later bound to come into the open, and raises or bonuses of the hush-hush variety are no exception.

If the foreman believes that a man has done an exceptional job and deserves recognition, then an open and above-board raise through regular channels is quite in order. To be sure, there will always be a few growlers who will make their envy known, but in the main, the shopman is essentially fair-minded and knows as well as the foreman when a shopmate has done work that deserves recognition.

I don't believe it is necessary to go to extremes, as Al suggests, and make a big pronouncement to the

effect that so-and-so has been given an increase in consideration of his hard work on a particular job. Every man in the shop at one time or another puts in a few extra licks that go unnoticed. To give one man undue publicity on top of his increase would be quite certain to arouse resentment. What it would do to the man's ego is also quite unpredictable.

One large aircraft company in the East handles this matter quite satisfactorily, in my opinion. They have what is known as a job rate, which is the going rate in the area, then an above-standard rate, a premium rate, and finally the top rate which goes from there to the supervisory brackets. This makes the foreman's job of making suitable recognition of a man's efforts much easier. Increases are handled in a routine manner, which in my opinion is better for shop morale.

Robert S Alexander
*Glastonbury, Conn*

THE POLICY of giving a secret raise and hoping to keep it under cover indicates a poor knowledge of human nature. It is next to impossible to prevent information of this type from leaking out.

If the foreman and the employee involved were the only ones who knew about the raise there would be some hope that it could be kept hidden for a while at least. This is not the case, for this information is common knowledge to the people in the personnel and payroll departments. The other shop employees may hear

BAKER

AUTOMATION

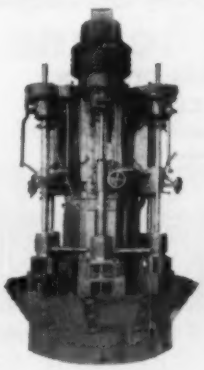
*Best in the long run*
*Practical in the short run*

**NEW BAKER SPECIAL**

**bores diesel engine cylinder blocks - automatically**

The latest of a long line of Baker special machine tools . . . operations are rough and finish bore and counterbore 6 to 16 holes for cylinder sleeves; drill dowel pin holes.

Compare with the early Baker special "Rotary" below — the *man* walked around the *machine!*



**BAKER BROTHERS, INC.**
**Dept. AM-957, Toledo 10, Ohio**

Send me data on automation with . . .
☐ Baker Specials ☐ Baker *standard* machines

NAME AND TITLE

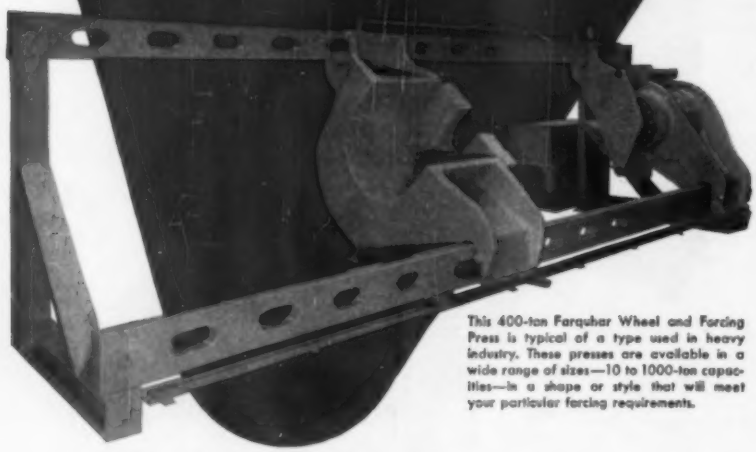
COMPANY

ADDRESS

CITY ZONE STATE

# Any forcing job is easy...

## on a FARQUHAR WHEEL and FORCING PRESS



This 400-ton Farquhar Wheel and Forcing Press is typical of a type used in heavy industry. These presses are available in a wide range of sizes—10 to 1000-ton capacities—in a shape or style that will meet your particular forcing requirements.

**Every Plant that has machinery maintenance or production forcing jobs needs a Farquhar Wheel and Forcing Press**

A Farquhar Wheel and Forcing Press is one of the most useful tools in any manufacturing plant. They are engineered and built to simplify the job of removing or pressing shaft mounted components. Ease in replacing gears, pinions, bearings, fly-wheels, rotors and the hundreds of jobs of that type—helps keep plant equipment down-time at a minimum, helps prevent loss of plant production hours.

Farquhar heavy duty Wheel and Forcing Presses are available in a wide range of sizes—10 to 1000-ton capacities—in a shape or style that will meet your particular forcing requirements. Write, wire or phone today —we'll be glad to submit our proposals and recommendations.

**Farquhar Special Machinery Department...**

Our skilled staff will build your special machinery economically—your inquiry will receive prompt attention.

**A. B. FARQUHAR DIVISION**
**The Oliver Corporation**
**Press and Special Machinery Departments**
**York 17, Pennsylvania**

OLIVER Farquhar PRESSES

*Also Manufacturers of Farquhar Conveyors*

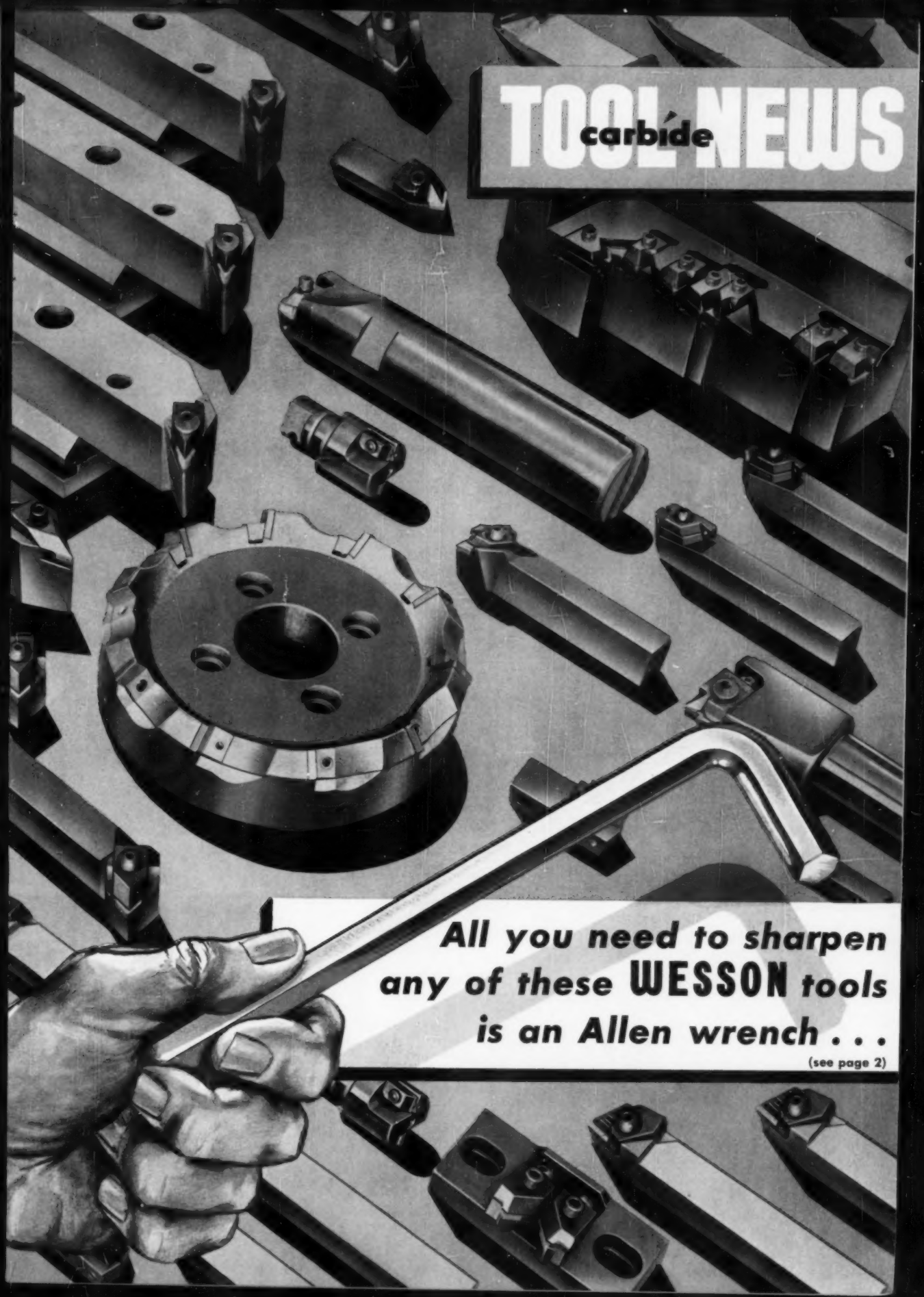

about the raise through friends in these departments, or perhaps the man who receives the raise may have some enemies who would take pleasure in divulging his secret. There are outside paths that may bring this information back to the shop. Perhaps the wife or the grocer where he cashes his check may unknowingly provide the lead.

Not only is it impractical to try to keep this information secret, it is the wrong thing to do for a number of reasons. The wages paid to employees represents a share of what they produce. The wages are compensation for their efforts. This is the accepted arrangement; it is an age-old system. The wages are not a gift or a bribe, they are earned. The amount of the wages is in accordance with the productive ability. This, too, is well known and provides an incentive to the employees to improve their ability and to produce more and better work.

A raise serves as a reward to the recipient for improved production. It is also a reminder and an indicator to the other employees that the size of the pay check is in proportion to their production.

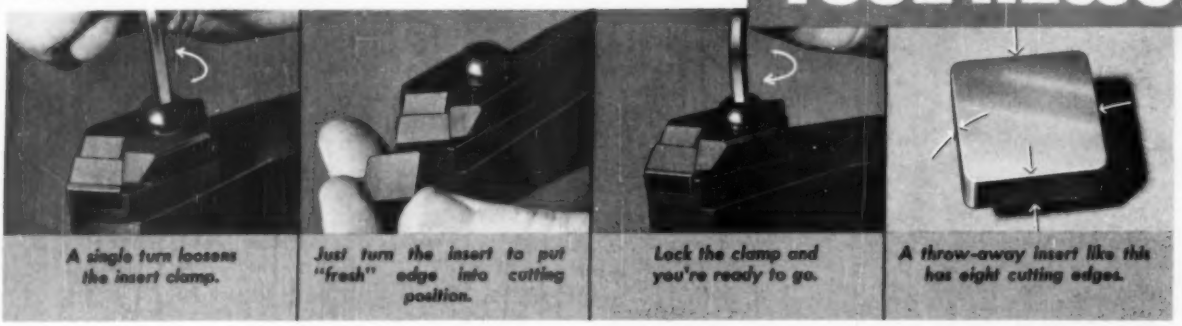
If an attempt is made to keep a raise secret it rewards the employee but it is not serving this secondary purpose. In addition to this secondary purpose there are several objections of a more serious nature. Secret raises will create antagonism and distrust. The men will become distrustful of the supervisors and of management in general. Most employees tend to overrate their own work and condemn that of others. The net result will be a feeling that

*"I put your report about the machine being dangerous in the file where we'll be sure to have a record of it."*


carbide
TOOL NEWS
All you need to sharpen any of these WESSON tools is an Allen wrench . . .
(see page 2)

*in just ten seconds . . .*

# TOOL NEWS carbide



*A single turn loosens the insert clamp.* | *Just turn the insert to put "fresh" edge into cutting position.* | *Lock the clamp and you're ready to go.* | *A throw-away insert like this has eight cutting edges.*

# How to Sharpen Tools with an Allen Wrench!

All of the **WESSON** tools shown on the preceding page are based on the use of indexable "throw-away" tips. When a cutting edge becomes dull, you simply index the tip to a sharp new edge. After all edges (up to eight) are dulled, the tip is simply discarded.

## Lathe Tools

Experience shows that **WESSON** throw-away tooling is economically suited to at least half of all single point tool operations. There is no tool grinding. Once set up on the machine there is no further setup time. Downtime for tool changes is reduced to the minimum. Ask for Bulletin #5510-M.

## Milling Cutters

Since it takes more time and costs more to sharpen or set up milling cutters than single point tools, the economic advantages of throw-away tooling in milling cutters are multiplied over single point tools. Moreover, the new **WESSON** milling cutter body, developed and designed specifically for throw-aways, gives ample support even for those heavy roughing cuts. Each blade is indexed just as in a single point tool and requires no adjusting.

## Boring Tools

**WESSON** micro-adjustable boring tools with throw-away tips are sweeping the field. Setup is simplicity itself, an Allen-type screw head being provided with a dial graduated to 0.001 inch (each turn is 0.025 in.). Once adjusted the tools stay put. Round, triangular or square inserts can be used with only minor parts changes. Ask for Bulletin #MB-157.


**Flash!**
**Big Carbide Study Now Being Completed**

A national survey of practices in industry in specifying, purchasing, and applying carbide tools is now being completed by **WESSON** Company. Methods of reducing costs are included. If you want an advance copy of the findings, reserve your copy today. Write MARKET RESEARCH DEPT., **WESSON** COMPANY, 1220 Woodward Heights Boulevard, Ferndale 20, Michigan.

tools **Wesson** carbide **Wessonmetal**

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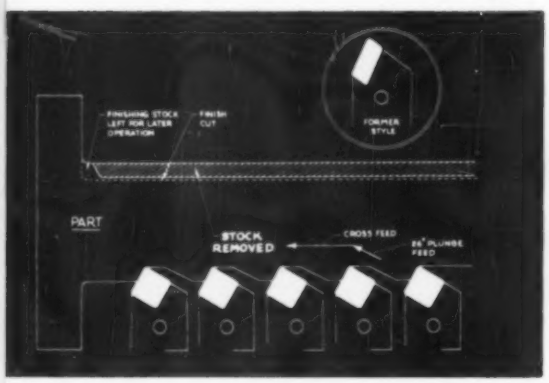



# Working with Wesson Saves $7200 On 1 Job

When you want to cut tool costs it often pays to break the cost down first. You can often cut it several ways. A **WESSON** service engineer helped prove this on machining OD's of tractor axle shafts.

Tool cost with brazed carbides on a 75 hp lathe was over $2 per shaft.

A study showed that even though a good steel-cutting carbide was used, there was quite a lot of tool breakage. Frequent tool changes made grinding costs high. A lot of time was lost in setups. Pieces per grind also looked low.

The job was tackled progressively like this:

1 The carbide was changed to *Wessonmetal* #26—a more versatile wide-range general purpose steel-cutting grade.

Its toughness cut the tool breakage way down and boosted pieces per tool change.

2 The tool type was switched to standard easy-to-grind-and-index ¾" square "on end" inserts in **WESSON** SDR-86B holders.

This doubled the cutting edges per grind, cut tool costs still more, and practically eliminated all setup time after grinding.

In addition to having cut tool cost from $2.09 to under 7 cents . . .

3 Production per hour was practically doubled—without changing feeds, speeds or depth of cut.

Annual savings on this one job: $7200.00!

Here are the figures:

| | Before | After |
|---|---|---|
| Cutting speed, sfpm | 275 | 275 |
| Feed rate per rev. | .017 | .017 |
| Depth of cut, max. in. | ⅛ | ⅛ |
| Machining time, mins. | 6½ | 6½ |
| Tool change time | 5 | 5 |
| Pieces per hour | 2½ | 5 |
| Pieces per tool change | 15 | 40 |
| Pieces per grind (all edges) | 30 | 320 |
| Pieces per tool/insert | 120 | 2560 |
| Grinding cost per tool | $27.00 | $12.00 |
| Initial tool cost | $79.77 | $55.28 |
| TOTAL TOOL COST PER PIECE | $2.09 | $0.066 |
| Annual savings/machine | | $7200.00 |

LITHO IN U.S.A.

raises are granted as a result of pull and friendship rather than ability and interest. In addition, the men will become antagonistic toward each other as though they were competing for raises. This is not true. The men do not compete against each other, but against the problems of their job.

If a man does a particularly good job he deserves a raise. However, if it is company policy to give such merit increases on certain dates, the foreman should abide by this policy. He can reward the man by telling him that he did a good job and that he will definitely receive a raise when the raise period comes around. He would like to get the raise now, but it is not difficult to wait a few months as long as he knows he is going to get it.

H Koslow
*Bronx, NY*

To GIVE special privileges to anyone at any time generally creates problems. The magnitude of these problems depends upon the extent of the special privilege. Thus, if someone is given a special raise in a group of only six or eight people, the problems arising from such a move might be that all others would feel they had been unjustly treated or overlooked. On the other hand, if the total employment amounts to some 50 or 100 persons, then the problem which faces a supervisor as to others wanting the same privilege is reduced. Why is this? Mainly because as the number of workers in a department increases, the less each person knows about the other workers' personal affairs. From this, less is known about special favors granted or raises given for special work alone.

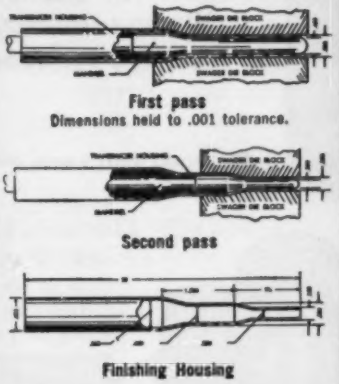
It seems to us, however, that regardless of the size of the department or the amount of special work done by an individual that no reward should be given. Our reasoning is that an employee works for his living. He must at times do special work without additional pay or reward. Why should any foreman single out certain individuals to give the gravy to? Sure, it is done. Even in small groups it is done, but more often in these cases the foreman takes a beating from all the others. Perhaps he can stand the strain but is he doing right? We think not.

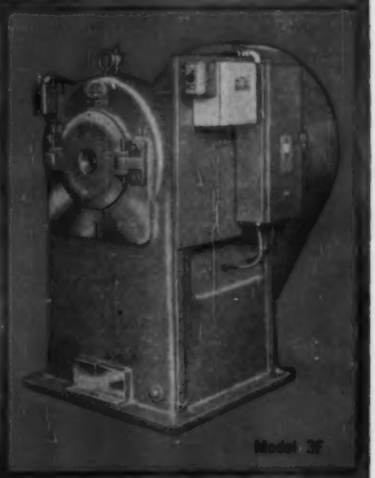
We feel that any special-privilege group within a company should not

*(Continued on page 240)*


ARE YOU MACHINING **when you should be SWAGING?**

**SWAGING TRANSDUCER HOUSING**




**How SWAGING cuts costs 80% on Transducer Housing**

The Cavitron Ultrasonic Dental Unit provides a marvelous new method for preparing cavities without noise, vibration and heat which contribute so greatly to dental pain and discomfort. Internal dimensions of the transducer housing are critical. A mating cap requires the outside diameter to be rigidly held as well. This housing was formerly machined in two parts and silver brazed together. Now, it is made in one piece from tube stock in 2 passes on a Fenn Model 3F Swaging Machine.

**RESULT** — Cavitron has not only reduced cost of the Transducer Housing 75% to 80% but now has a simplified one-piece housing that is stronger, easier to make and with a smooth, bright surface resulting from swaging which requires no additional finishing. Write for catalog and full information.

FENN

**SWAGING**
may have important advantages and savings in the manufacture of your products. Fenn engineers are at your service.

Precision Rolling Mills

Turks Heads

Wire Shaping Mills

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Wire and Tube Drawing Machines

**THE FENN MANUFACTURING COMPANY,** 104 FENN ROAD, NEWINGTON, CONN.

LITHO IN U.S.A.

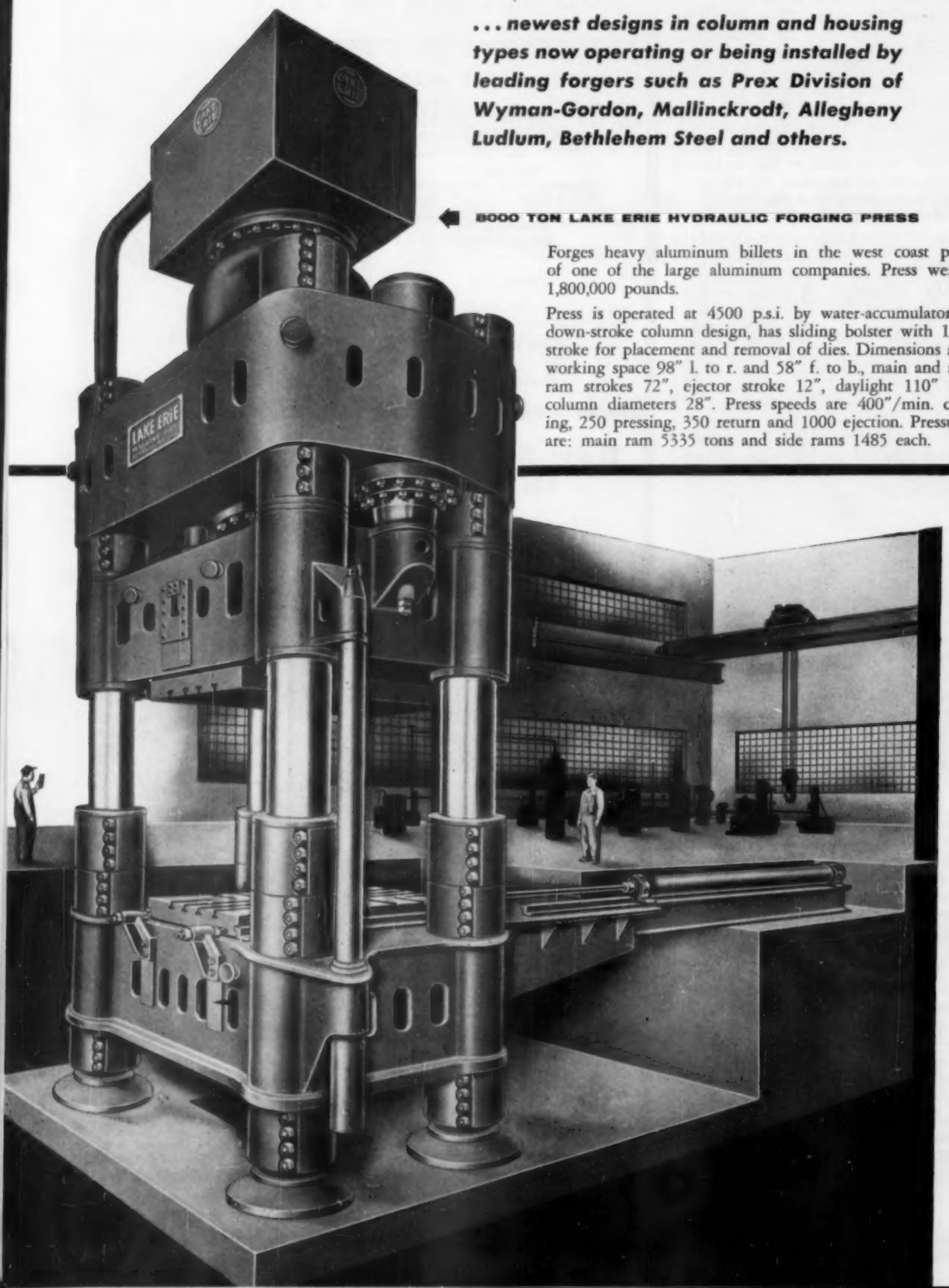
# FORGING PRESSES . . .

***. . . newest designs in column and housing types now operating or being installed by leading forgers such as Prex Division of Wyman-Gordon, Mallinckrodt, Allegheny Ludlum, Bethlehem Steel and others.***

**8000 TON LAKE ERIE HYDRAULIC FORGING PRESS**

Forges heavy aluminum billets in the west coast plant of one of the large aluminum companies. Press weighs 1,800,000 pounds.

Press is operated at 4500 p.s.i. by water-accumulator, is down-stroke column design, has sliding bolster with 112" stroke for placement and removal of dies. Dimensions are: working space 98" l. to r. and 58" f. to b., main and side ram strokes 72", ejector stroke 12", daylight 110" and column diameters 28". Press speeds are 400"/min. closing, 250 pressing, 350 return and 1000 ejection. Pressures are: main ram 5335 tons and side rams 1485 each.



# ..by LAKE ERIE

**LAKE ERIE FORGING PRESSES** include self-contained and water accumulator types, and ferrous and non-ferrous models for no-draft, closed die and open die forging. They are available in 3 cylinder designs for planishing.

**LAKE ERIE FORGING PRESSES** feature inserted forged steel cylinders, tie rods pre-stressed to 150% of press tonnage, chrome plated rams, platens designed for eccentric loading, a prefill system and a unique valving design that permit the highest forging speeds.

LAKE ERIE MACHINERY CORPORATION, *successor to*

**LAKE ERIE ENGINEERING CORP.**

*507 Woodward Avenue, Buffalo 17, New York*

**Manufacturers of the Most Complete Line of Hydraulic Presses for All Industry.**

LAKE ERIE®

**4000 TON**
**LAKE ERIE HYDRAULIC FORGING PRESS**

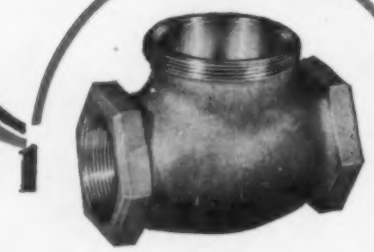
One of two such presses in the same west coast plant used to open-forge heavy aluminum billets. Press weighs 1,230,000 pounds.

Press is accumulator operated at 4500 p.s.i. water pressure. Sliding bolster with 105″ stroke inserts and removes dies. Working area is 90″ r. to l. and 70″ f. to b. Daylight is 90″, shut height is 45″. Main ram stroke is 45″, horizontal side rams 24″ each, ejector in bed 12″. Main ram closes and returns at 600″/min. and applies 4000 tons pressure at 300″/min. Each side ram closes at 400″/min. and presses 1985 tons.

ONLY

**GOSS and DeLEEUW AUTOMATIC CHUCKERS**

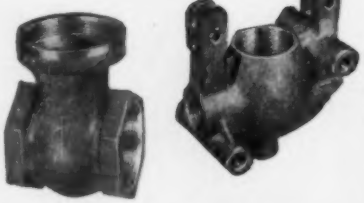
*offer the* **1-2-3** *feature*




This NEW development—unsurpassed for speed, convenience of tooling and precise finish—involves no retooling problem even for short runs. It assures greater production at lower cost on all classes of work.

**The unique "1-2-3" feature, exclusive with Goss & De Leeuw, provides the means for performing one to three right or left hand single or double threading operations simultaneously or in sequence, without changing set up.**

Here's an ideal machine tool for small lot requirements because of quick, easy changeover. Any class of chuck work can be handled economically in any quantity.



The examples of work shown here are typical of the wider variety of parts being produced on these new machines.

**SEND FOR** detailed information on this new machine. Let us have samples of your work in order to give you time and cost estimates for handling it on the "1-2-3" Goss & De Leeuw.

GOSS & DeLEEUW

**GOSS and DE LEEUW**
**MACHINE COMPANY, KENSINGTON, CONN., U.S.A.**

exist. All workers should be given the same rights. We remind you that it is true that some workers are more qualified to do certain work and these are the ones who are chosen, but why give them special compensation? They already have been given additional pay for being the better equipped workers to do the job.

A company who tries to favor one or two individuals is asking for trouble. They are actually courting disaster with labor. Today we cannot afford to have our workers unhappy because our labor picture is such that we cannot readily replace good workers. It would be far better to properly merit-rate the workers at the next authorized period. Do a better job of rating on all employees and let this method of handling raises be the method to compensate the better workers.

Don't create conditions which soon get out of your control. Remember that the procedure on grievances today holds little hope for the foreman to keep his standing if he is playing favorites. In other words, pay on the square and don't pay off on the sly.

Charles D Townsend
*West Hartford, Conn*

SPECIAL merit increases will be the rule in every well ordered plant, otherwise progress will be slow and not very sure. In most progressive industrial countries there are district rates. The district rate is the minimum rate that can be paid for skill, although less scrupulous em-

*"Nope, they just don't make 'em the way they used to—Thank the Lord!"*

ployers have been known to regard it as the maximum. It is an agreed minimum between the employers and the unions and all sensible employers accept it as such. That arrangement leaves ample scope for employers to recognize, in terms of money, degrees of skill. Merit advances should be given openly as a matter of course. There should be nothing secret or confidential about the transaction.

There might be a case for withholding publication of the actual amount of the merit advance. Some hold that the amount concerns no one but the man involved and I am inclined to agree. I regard it as most important that the name of the recipient of a merit advance should be posted on the works notice board, along with brief particulars of how it was earned. Quality of work, quantity of work, good timekeeping, cooperativeness, good influence, to cite a few examples. The better elements in the shops will respond to the notice board method and will try to emulate the achievements of the successful ones. The others, the minority, will probably pour ridicule on it, but they don't count and need not be appeased.

It's a great tactical blunder to reward merit by stealth. It makes the recipient uncomfortable instead of happy. He is conscious of the fact that the pay clerks will know all about his merit advance and is apprehensive that a careless remark from that quarter may well cast suspicion of blabbing on him. No man worthy of a merit advance should be placed in such an invidious position.

I don't think any firm should go to the trouble of working out fancy measures to protect the foreman from demands for merit money by those who don't deserve it. It wouldn't be a success, anyway, for long. The only method that permanently suceeds in dealings with one's fellow men is the direct, straightforward one of truth and candor. The frank method of openly recognizing real merit is impervious to abuse or misunderstanding. It serves notice on all concerned that merit money is open to every one to compete for, but it must be earned. It can't be had by badgering the foreman, nor can it be had by being in the swim with him. There is nothing nebulous about it; only tangible evidence of merit can bring recognition.

Not many foremen are guilty of giving increases as a matter of favor, and if any were so inclined, the publicity of the notice board would


SELECT-O-PUSH SAVES SPACE WITHOUT SACRIFICING FUNCTION!

One unit, the Westinghouse Select-O-Push, combines a pushbutton and selector switch to do the job normally requiring two assemblies. It cuts panel-front space need by half.

When wired with a standard double-pole contact it becomes versatile in limited space, freeing valuable enclosure area.

The same attention to detail built into all Westinghouse controls applies to the Select-O-Push. It functions excellently where moisture threatens. Tight-fitting gaskets, stainless steel shafts, precision milling—all help keep out harmful liquids.

*A Guide to Control* (B-7022) will tell you more about Oil-Tite* controls. The new 72-page *Push-button Guide* (B-6749) will give you information on the complete line. Write to Westinghouse, Box 868, Pittsburgh 30, Pa. *Trade-Mark J-30254

YOU CAN BE SURE...IF IT'S

Westinghouse

make them think twice. The men are quite alive to the identity of the deserving ones and caustic remarks would be sure to greet the appearance of other names on the notice-board merit list. Fearless, frank publicity is the surest way to scotch abuses. Al is on firm ground when he suggests publicity as opposed to secrecy.

I don't agree with Ed when he fears a man who merits an advance might hesitate to accept, in case some who had been passed over got sour. Why should he? If he won a works sporting event he would not refuse the prize in fear of the losers. There will always be winners and losers, and if the losers are bad losers, so much the worse for them. Only *they* can remedy that state of affairs.

A "passed-over" would read on the notice board what the various men were being recognized for and would be expected to state to his shop foreman the achievement on which *he* staked his claim. If the claim was genuine and the foreman had overlooked it—a most unlikely happening—the matter could easily be rectified. If it wouldn't hold water, the foreman should have no difficulty in indicating why.

A little originality on the part of both might work wonders. The unions all follow each other like sheep, in out-of-dateness, and many employers follow suit, but not all of them. An American firm operating in Scotland pursues an independent line and profits by its courage and enterprise. It practices the open-shop principle, employing union and non-union labor at will, doesn't recognize shop stewards, but pays union wages

*"Think man! Ask yourself how Archimedes, Galileo, or Isaac Newton would have approached a metalworking problem."*

**Makes tough ones *EASY* —and easy ones *SURE!***

**THE PROFILOMETER**® makes it easy to measure the roughness of nearly *all* machined and finished surfaces, no matter where they are located. It *shows* the roughness, on a meter, in standard *microinch units.* And it gives *consistent, accurate readings* for any surface from polished glass to rough-machined forgings — regardless of the place, the time, the operator, or the equipment used.

As you can see, the Profilometer is a SHOP TOOL, and can be used wherever desired. It is fast and simple to operate (needs no special skill or experience) — is built for hard service — and is reasonably priced. It is *standard equipment* in *thousands* of production and inspection departments, throughout the world.

**FREE ILLUSTRATED BULLETIN** gives details, and describes *cost-saving applications.* Write for it!

OTHER MICROMETRICAL PRODUCTS include the PROFICORDER® (for obtaining magnified surface profile records); WAVOMETER® (for measuring waviness around surfaces of rotation); ANDEROMETER® (for measuring the over-all quality of assembled ball bearings). Illustrated bulletins on request.

**Representatives in principal industrial centers throughout the Free World**

Names of above products are registered trade-marks.

MMC
MICROMETRICAL
MANUFACTURING COMPANY
351 S. MAIN ST. ANN ARBOR, MICHIGAN

all round, observes all union agreements and operates an attractive incentive scheme. Everything of shop interest goes on the notice board. This is not to suggest the firm has no worries, but those it has are little ones and the company gets all the labor it wants. Inefficiency is not tolerated, and despite the independent attitude, the strict discipline and, perhaps, because of the attractive incentive to excel, labor is drawn to that plant as steel filings to a magnet.

C Donald Mackinnon
*Lanarkshire, Scotland*

I AGREE with Al that it is impossible to give a man in the shop a special raise without the whole crew getting to know it after a while.

But there are many other means of giving a guy credit besides raising his pay. For instance, if Harris worked on those special orders and did so well that Al thought he should have something extra for it, he could have sent him to the company who ordered the goods to inquire about some dimensions, quality of finish, or any other reason and let his own company pay his expenses. That, I don't think, would make the others jealous. Of course, such things could not be arranged without the management accepting it, but that should be easy to acquire.

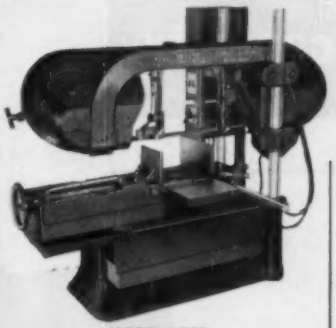
Otherwise a pat on the shoulder and a promise that Al would remember him when there would be a chance for promotion, should also go quite far.

On the other hand, if Al does not recognize Harris's value to the company, he might leave and go to work for another employer where his ability is better taken care of.

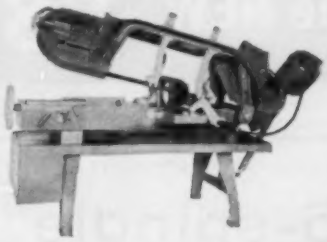
However, if Harris is worth more to Ed's and Al's shop than he is receiving, he should have that special raise no matter what the other guys think or do. Nobody, as far as I know, makes any complaints about a very good man being paid better than the average worker. The union rates are minimum rates as a rule. Not even in the communist-ruled countries do they have the same pay for everybody.

It is very important that initiative is recognized, otherwise all interest by those who have any ideas for sale is lost, and that would be a pity. Where would our mechanical industries stand today if ideas were not collected and put to use? I think it would throw us back several dec-

*(Continued on page 246)*

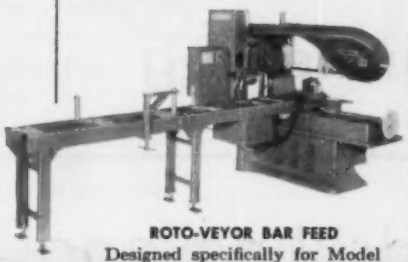



**MODEL 1200**
A rugged, horizontal band saw for heavy duty production cutting, with a completely automatic cutting cycle. Capacity: 12" x 16". Wet cutting standard.



**MODEL 1000**
Big capacity production saw, using 1" blades for greater accuracy and efficiency. Capacity: 10" x 16". Shown with optional wet cutting system. No. 8 and Model 600 are similar.

**MODEL 49-A**
Dual purpose economy band saw shown as a horizontal cut-off machine. Raise cutting head to upright position—it's a vertical band saw. Capacity: 3½" x 6".



**ROTO-VEYOR BAR FEED**
Designed specifically for Model 1200. All feed rollers powered. Not shown is the Wells-O-Bar Feed Master, available for Model 1000, No. 8 and other pivoted type machines.

# WELLS-QUALITY CUT-OFF SAWS

## . . . designed and engineered for the "VALUE BUYER"

Take a good long look at value . . . it's an important factor in the fight to stem rising costs.

For over 30 years, Wells Manufacturing Corp. has engineered into every horizontal metal cutting band saw, a combination of practical value features designed to give you the most for each dollar you spend. Extra rigid, heavy duty construction; "constant load" blade tensioning; safety switches with overload protection . . . these are just a few of the value-packed features that help you do a better cutting job at a lower unit cost.

Put Wells to the test . . . compare them with other makes . . . it's the best way to satisfy yourself of their OUTSTANDING PERFORMANCE and BIG VALUE.

*Ask your Wells Distributor for full information and assistance.*

| | Model 1200 | Model 1000 | No. 8 | Model 600 | Model 49-A |
|---|---|---|---|---|---|
| Capacity, Rectangular | 12" x 16" | 10" x 16" | 8" x 16" | 6" x 13" | 3½" x 6" |
| Capacity, Rounds | 12¾" | 10" | 8" | 6¾" | 3½" |
| Speeds, Ft. Per Minute | 60, 115 | 50, 100 | 50, 100 | 50, 90 | 54, 100 |
| | 200, 300 | 175, 275 | 175, 275 | 160, 250 | 190 |
| Motor Size | 1 H.P. | ¾ H.P. | ½ H.P. | ½ H.P. | ¼ H.P. |
| Blade Size | 1" x 13'6" | 1" x 11'6" | ¾" x 11'6" | ⅝" x 8'2½" | ½" x 5' |
| Height to Top of Bed | 24¼" | " 25½" | 25½" | 25½" | 24" |
| Floor Space | 44" x 78" | 24" x 72" | 24" x 72" | 21" x 50" | 16½" x 38" |
| Shipping Wt. (Approx.) | 1950 Lbs. | 705 Lbs. | 650 Lbs. | 425 Lbs. | 145 Lbs. |

Wells SAWS
Wells
®

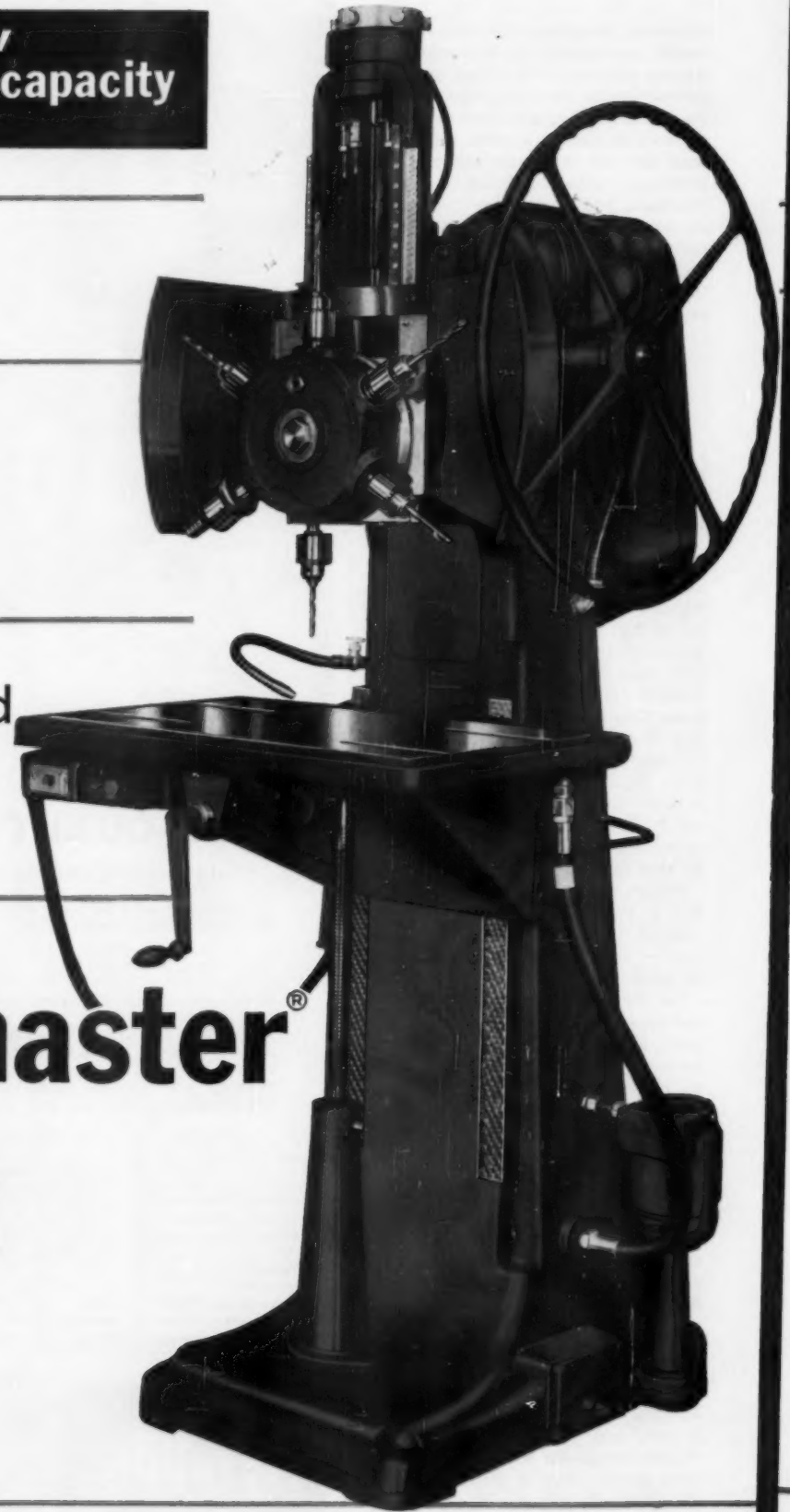
*The Pioneers of Horizontal*
**METAL CUTTING BAND SAWS**
**WELLS MANUFACTURING CORPORATION**
505 Roosevelt Road, Three Rivers, Michigan

**The NEW 3/8" capacity**

6-spindle

automatic indexing

drilling and tapping



# Burgmaster® Turret Drill

sensitive, fast **Model 1C**

Larger models in capacities

**The Model 1C** turret drilling and tapping machine expands the Burgmaster line to include a smaller capacity, sensitive feed, fast operating machine. It is built to the same rugged standard for rigidity and accuracy evident in the larger units. The Burgmaster principle of bringing the spindle to the work eliminates the necessity of realigning for each operation. This reduces scrap and cuts time and in many instances eliminates fixtures. This unit frees heavy duty machines for larger capacity work.

## SPECIAL FEATURES

- automatic indexing
- 7″ spindle travel
- preselective spindle speeds
- precision depth control
- sensitive hand feed
- quick setup
- close tolerances maintained
- low maintenance cost
- surface ground work table

## SPECIFICATIONS

| | |
|---|---|
| Drill Capacity in mild steel | ⅜″ |
| Tap Capacity in mild steel | ⅝″ N.F. |
| Drill Motor | 1 HP, 2 Speed, 3 Phase, 60 Cycle |
| Turret—Spindle Travel | 7″ |
| Throat Depth | 9⅜″ |
| Spindle Runout at Spindle Nose | .0003 TIR |
| Accuracy of depth control | .002″ |
| Max. Tool Clearance | 4⅜″ Diam. |
| Size of the Table | 14″ x 24″ |
| Max. Clearance, Spindle Nose to Stand. Table | 24″ |
| Min. Clearance, Spindle Nose to Stand. Table | 8¼″ |
| Clearance Spindle to Base | 42″ |
| Max. Height | 75″ |
| Max. Width | 27″ |
| Max. Length | 38″ |
| Weight Uncrated | 1000 lbs. |
| Weight Crated | 1200 lbs. |

20 minute, sound film available on request from any of our offices. Shows all models and new positioning table in action.

For complete information contact our nearest office or phone, wire or write Dept. AM-9

**BURG TOOL** Manufacturing Co., Inc.
15001 South Figueroa Street, Gardena, California

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**CHICAGO:** 5329 Lincoln Ave., Chicago 25, Ill. Phone: LOng Beach 1-1178
**DETROIT:** 13730 W. 8-Mile Road, Detroit, Mich. Phone: LI 8-4333
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**from ¾″ to 1½″ are also available in hand operated, automatics and radials**

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## Assures 50% LESS TURNOVER HERE where it really counts

TURNIT, makes *correct* rotation of diamond tools a simple effortless operation; saves 50% and more in diamond tool cost.

Now you can get a better wheel finish, closer work tolerance, longer wheel life and, at the same time, eliminate wheel glazing and minimize grinding wheel heat, cracks and fractures.

There is a TURNIT for almost every grinding application on all types and models of grinders. Whether you wish manual or automatic operation, internal or external installation call or write for recommendations.

For further information ask for your copy of the new Turnit bulletin.

J. K. Smit are also manufacturers of diamond tools, diamond wheels, diamond drill bits, diamond lapping compound and diamond powder.

**J. K. SMIT & SONS, INC.**
Murray Hill, N. J.
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ades, and know-how would advance much slower than it does now.

There is no need of making a big announcement about how hard any guy worked to get a special raise. That would sound too much like hot air. No man would be afraid to take a raise because the others would resent it. Every man wants to work for his own benefit.

I think Al is about right when he says that if a man is afraid to take credit for his work, he is working hard for the wrong reason. But don't be too sure Al; he might look for a higher goal than the money he is getting for his daily effort, even if he prefers to get both credit and the dough.

Even a man whose ability and energy hardly come up to the average mark wants to make as much money as possible and becomes jealous if anybody else gets more than he does. It is impossible to work out rules that would protect the foreman from demands by those who do not deserve any special raise. But where any man's merit is above the average, and his behavior is excellent, extra money should be paid no matter what the others say about it.

A E Fristedt
*Stockholm-Bromma, Sweden*

THE USE of a merit-rating system is the answer to the question as to whether special merit increases can be worked out to protect the foremen from demands by those workers who don't deserve them.

Merit rating is the most effective method for discovering, analyzing,

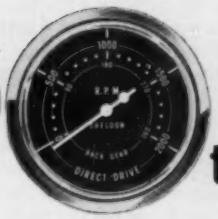
*"Stop pointing out the good parts when I point out your bad parts! Our inspection department doesn't work that way!"*

and classifying the differences among workers relative to the jobs they are performing, and setting a fair basis for special raises for deserving workers. It is the only equitable way that employees can be rewarded for outstanding work and initiative, and eliminates the objectionable device of the secret "payoff on the sly." When employees know that a merit-rating system is used by the company there will be little likelihood of demands being made by undeserving workers for merit increases. They will know that special work and outstanding ability will be recognized and rewarded through an established system of periodic merit rating. The efficient, accurate, and versatile worker will get the credit —and the money—and it won't be necessary to keep it a secret.

Merit rating will reveal the differences among workers on the job. These differences in performance, progressiveness, initiative, and attitude will determine which workers are entitled to special merit increases.

Regardless of how carefully workers have been selected, placed, and trained, the question arises of how able they are on the job and what their possibilities are for development in the work and within the company. To determine, this systematic analysis is necessary. Foremen have always analyzed their workers, formed opinions, and made judgments of them. However, these opinions and judgments are sometimes only the haphazard impressions accumulated from different experiences. The consistency of behavior trends and the meaning of such trends in terms of job requirements are seldom methodically related. A merit-rating system, however, forces observation of the worker in a systematic manner. It is possible through merit rating to evaluate a worker's traits and detect changes in traits and performance from time to time. This rating plan will provide a permanent record on a systematic practical basis for promotion and special raises. By rating, the foreman can measure the extent to which workers are meeting or exceeding specifications in the job done. He can appraise workers periodically by the job standards, can recognize differences in amount and quality of worker performance, and can reach a sound judgment for wage-increase recommendations.

Merit rating plans now in use in industry usually rate the following worker traits. The foreman uses a form every month to rate each work-


from  to in 9 seconds

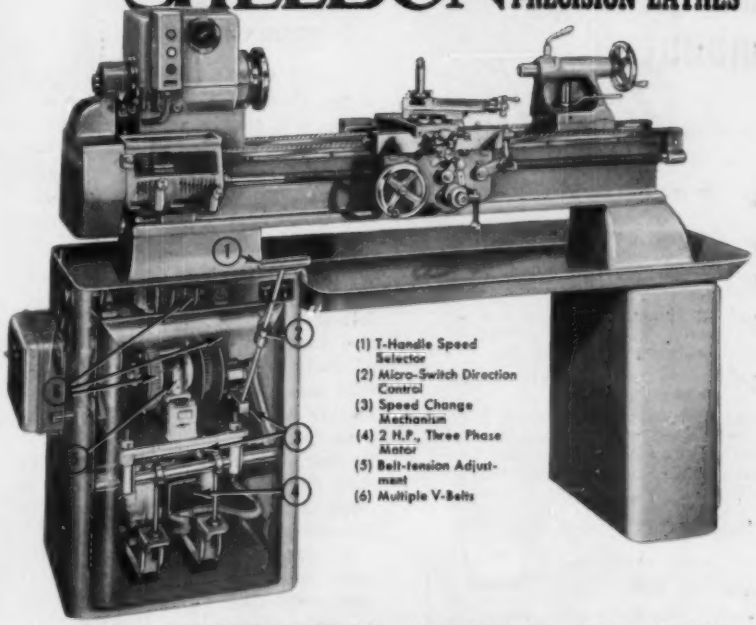
or to *any* intermediate speed, *instantly*

Just raise or lower the T-handle control, and watch the large tachometer dial in the headstock! It's that easy! The work is done by a power driven speed changer. It accelerates or slows the lathe to any desired speed in seconds. With a 10:1 ratio, this new variable drive makes it easy to select from a wide range of speeds —200 to 2000 rpm in direct drive and 40 to 300 rpm in back gear.

Maximum stability and smooth power transmission are assured because the drive unit is oversized. All pulleys and shafts are fully supported (eight bearings). Double V-belts throughout the drive eliminate slippage and deliver full power to the spindle. Because of this rigidity and extra pulling power, this lathe will take heavy cuts at all speeds and precision finish cuts at high speeds.

It is a precision lathe, moderate in price, with the versatility for toolroom, production or second operation jobs.

SHELDON *Variable Speed* PRECISION LATHES


(1) T-Handle Speed Selector
(2) Micro-Switch Direction Control
(3) Speed Change Mechanism
(4) 2 H.P., Three Phase Motor
(5) Belt-tension Adjustment
(6) Multiple V-Belts

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10", 11" and 13" SHELDON Precision Lathes (Bench, Pedestal and Cabinet types)

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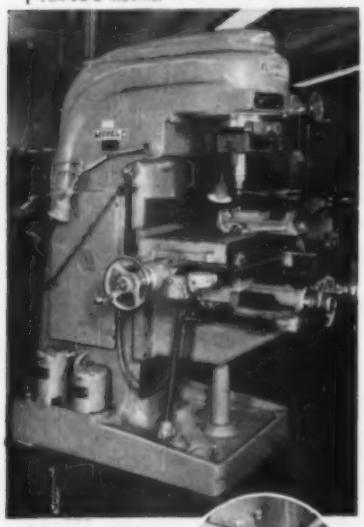

Here's the VINYL vibration dampening mount Air-Loc® 4·17·4

- ✓ *Completely resists* oil, water, etc.
- ✓ *Reduces* transmitted noise & vibration as much as 85%.
- ✓ *Shims easily* for quick leveling.
- ✓ *Eliminates* use of bolts and cement. Vinyl serrations hold machines to floors.
- ✓ *Reusable* when you move machines.

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er on his performance including accuracy and quality of work; efficiency, or use of working time; speed, or quantity of work; and job knowledge. In addition, the worker's mental ability and leadership qualities are also taken into consideration in rating. His attitude toward his job and supervisor, his initiative, judgment, and cooperativeness are also considered. Each worker is graded "excellent," "good," "fair," or "poor" in each of the above qualities. This periodic written record will keep the foreman up to date on how new workers are progressing and it will also give him a written record of his impressions and findings of how everyone else in his group is doing.

The use of a merit-rating system will publicize the fact that credit is given for doing special work and for outstanding initiative and performance. The willing worker who does the tough jobs will be rewarded, and the foreman will not have to resort to "paying off on the sly" in giving deserving workers special raises. It will be no secret that the only way to get special merit increases is to earn them by initiative, and good hard work.

Harry Kaufman
*Philadelphia, Penna*

## FISHIN'—FOR SKILLS

***If there's no one currently qualified in the shop to run a particular machine, is it good management policy to bring in an experienced operator from outside? Or should an inexperienced inside man be upgraded and trained for the job?***

SHOULD Al fight to get the experienced outside man, or should he follow Ed's advice and promote the less experienced man from inside? Al could do worse than test the outside market for skilled men. Promoting in the shop can easily be overdone and the choice is often limited. The man upgraded in the shop has, broadly speaking, a lot to learn if he has been a long time in the one shop on the one job.

Al does not seem to be carried away with Hammond's ability. He seems to make a poor show on the boring machine, and, if Al is right in that, he is just as right in going after an experienced outsider, highly skilled and ready to give a high output from the word go. Al is realistic in this case and Ed is fumbling, as if Hammond was the only pos-

*(Continued on page 252)*

SANTOS DUMONT was NEWS

Santos Dumont was not a place, but a person — from Brazil. He gained a great deal of attention in 1907, when he flew an aeroplane a distance of 235 yards in 21 seconds — carrying a passenger! This historic flight took place in Paris, and was "news" all over the world. Curiously enough, few people at that time were aware of the Wright brothers' history-making flight at Kitty Hawk in 1903; most people then thought of "aviation" as floating about in balloons or dirigibles. It was something you watched at the County Fair — or perhaps at the International Bennett Cup Race.

In this era of scientific and industrial pioneering, our founders Soren Sorensen and John Christensen came west to Cincinnati and started making gears. Cincinnati Gear's beginning was as modest as the aviation industry's; and like the aviation industry, we have grown and progressed significantly in the past fifty years. But one thing has not changed — our old fashioned attention to detail, that insures our gears being 100% *right* every time. It results in a reliability and dependability that our customers like — that *you'll* like too. Why not try us for your next custom gear order?

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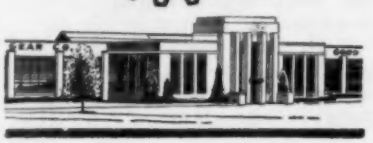

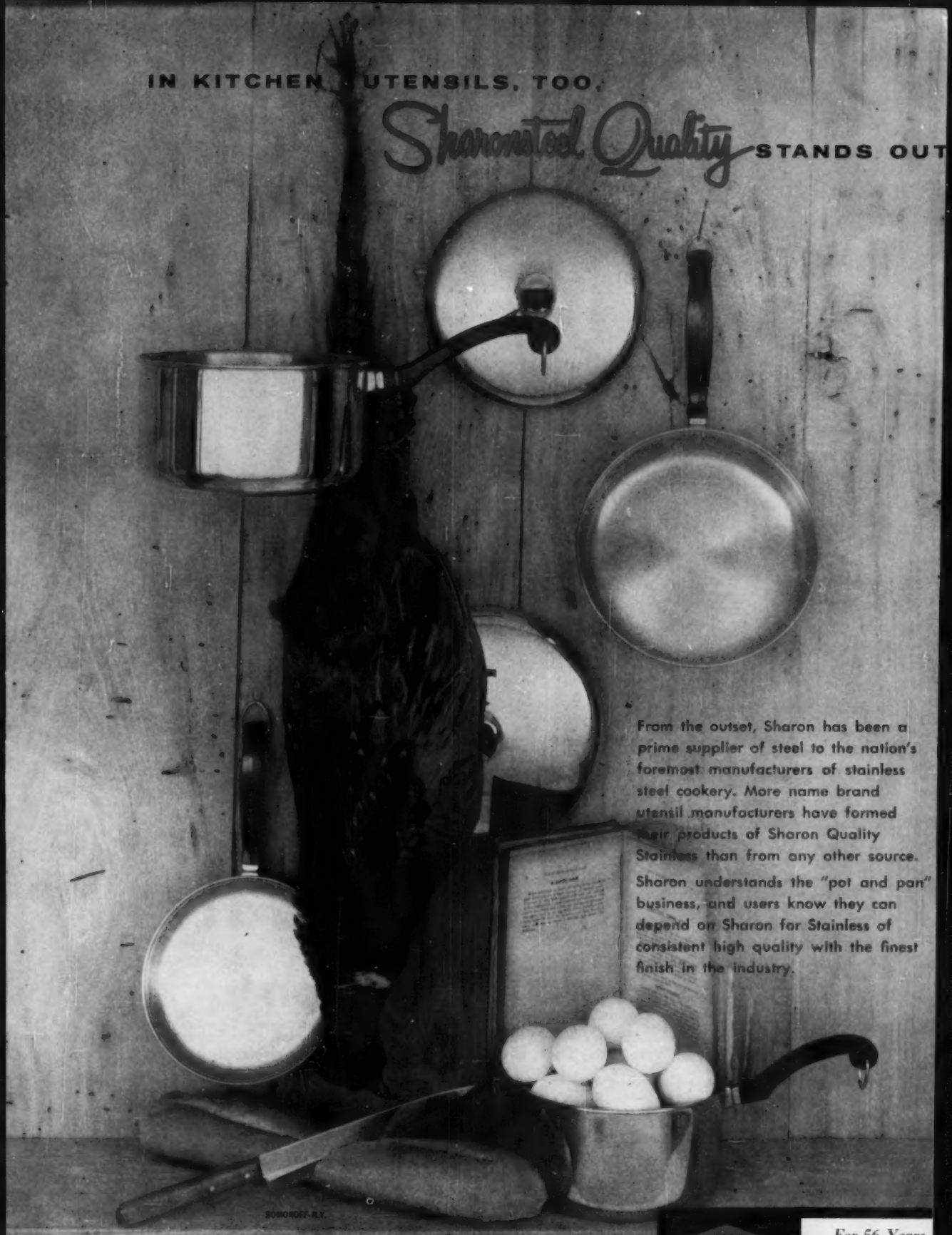
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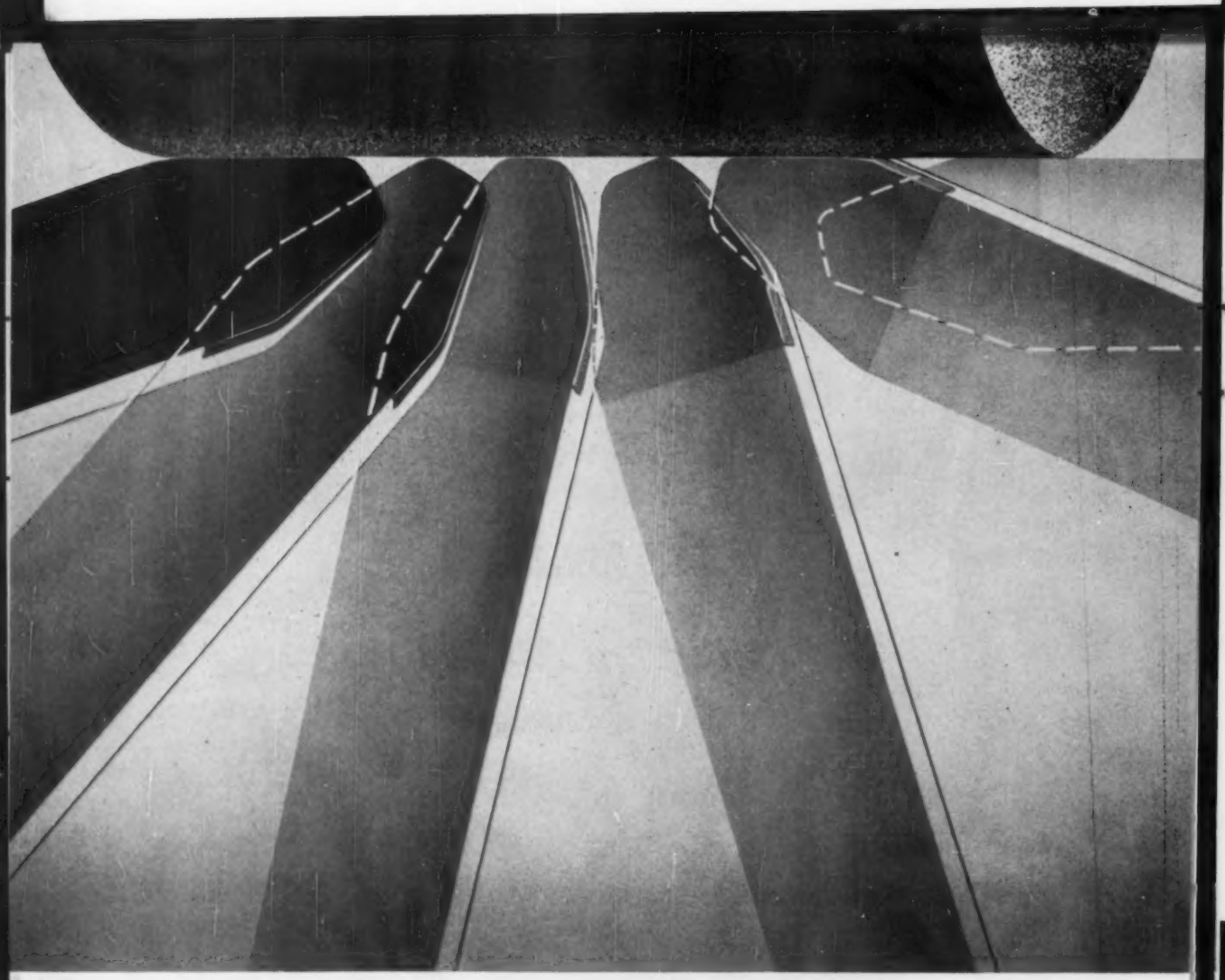


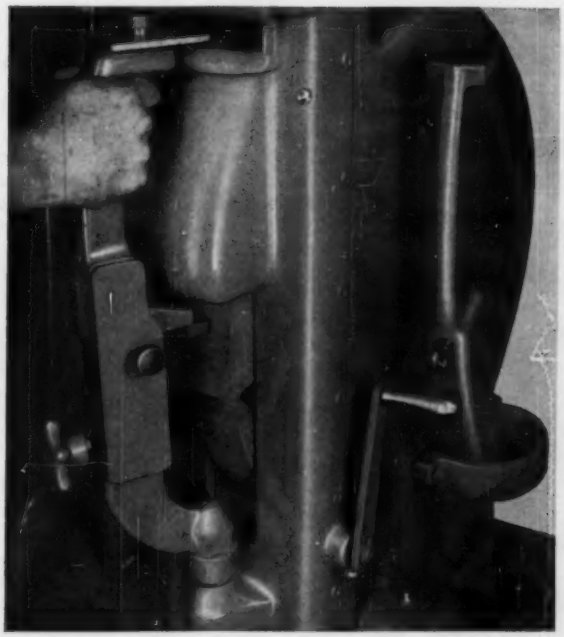
## OLIVER TEMPLATE TOOL BIT GRINDER

# Precision Duplication

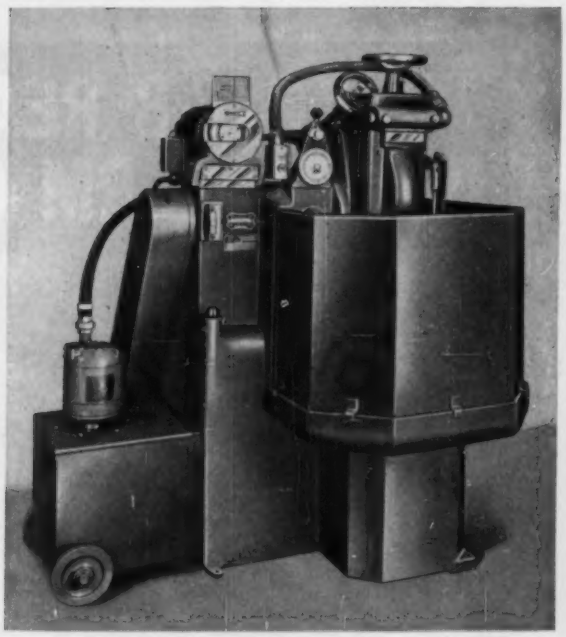
## *in* ONE *operation*

That's right! The Oliver Template Tool Bit Grinder sharpens single point tungsten carbide, high speed and stellite turning tools . . . duplicating exactly all original flats and radii every time the tool is ground . . . in one simple, efficient grinding operation.

How is it done? Well, as you can see from the drawing above the answer lies in "template control." The template at the top of the specially designed tool holder is a twice size replica of the tool being ground. The tool, securely held at mid-point in the holder, contacts the wheel and is ground until the template touches the template stop. In this manner, the tool is ground to the *exact* profile of the template. The entire operation is performed in seconds, easily, accurately on one machine . . . a machine that pays for itself by reducing your tool inventory and eliminating lost production time and tool breakage.



The Oliver Template Tool Bit Grinder has a 20″ wheel that grinds turning tools up to 1½″ wide by 1¾″ high, from 0° to 20° clearance . . . and to *any* predetermined contour or angle. The unit is self-contained in that it performs the complete grinding operation as well as template production. All working surfaces are hardened and ground steel and surfaced with tungsten-carbide where necessary to assure long life. A unique feature of the unit is the tool holder which permits an even, easily controlled tool pressure against the wheel. It's an iron frame—supported at its lower end by a ball and socket joint with a template at the upper end giving the operator a 2 to 1 leverage.



Outstanding among the Oliver Tool Bit Grinders' many advantages is ease of operation. Positive "template control" assures duplication of the tool shape in relation to the shank making all tools of a kind exactly alike. A clearance setting gauge determines the correct amount of metal to be removed. A plentiful supply of water, both through the wheel and on the tool, insures against overheating. The Oliver 20″ Template Grinder will remove metal . . . both high speed and tungsten-carbide . . . at a speed unmatched by any other single point tool bit grinder currently on the market.

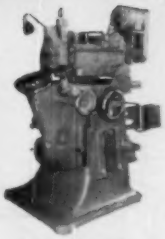
## More OLIVER of ADRIAN Tool Grinding Equipment

**ACE TOOL and CUTTER GRINDER**

Universal—grinds milling cutters, other cutting tools. Especially suited to grinding tungsten carbide.

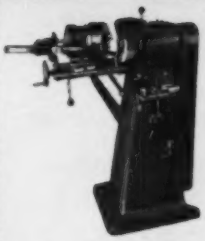
**DIE MAKING MACHINE**

Produces dies, gages, cams, templates, stripper plates, etc. at greatly reduced costs. 5 designs in 2 types.



**FACE MILL GRINDER**

Completely automatic. A machine tool designed for accurate grinding. Wheel dressed with every stroke.



**No. 510 DRILL POINTER**

Semi-automatic. For drills ¼″ to 3″ in diameter. No. 21 bench models available for size ½″ and smaller.

**DRILL POINT THINNER**

For low cost reclaiming of drills. Corrects off-center and too-thick webs and out-of-index cutting edges.

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- ☐ Face Mill Grinder
- ☐ "Ace" Universal Tool and Cutter Grinder
- ☐ Die Making Machine
- ☐ Drill Point Thinner
- ☐ Template Tool Bit Grinder

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The template at the top of the specially designed breakage.


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**1** Chamfer relief angles are precise . . . eliminate chatter and assure longer life.

**2** Critical land clearances are accurate . . . provide smoother finishes and eliminate binding.

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sibility. Al would make a great mistake if he upgraded Hammond.

On his own word, he has no faith in the man. That is a bad prospect to begin with and could do Hammond a lot of harm. Al would, unconsciously, perhaps, tend to magnify all his mistakes because he did not believe he was the man for the job. Hammond would be sure to resent that sort of treatment. There would be prejudice and bad blood between them and that would not help to produce good work. Nor would it help the firm. Ed favors Hammond but admits that it might be a year before he could be put on his own. A year is a longe time to be saddled with a comparative novice on an important production machine.

Ed says it's the general policy of the company to upgrade their own men. Many company's favor that plan but "general policy" is not absolute. It probably means that suitable men should be upgraded, and Al does not appear to look upon Hammond as suitable for the purpose, If Al is running the section, he should know, provided he knows his job.

If Harrison is backing Hammond against Al's advice, he is very foolish. He is tying his foreman's hands, both of them, behind his back. Harrison will, no doubt, hold Al responsible for production and, in fairness to him, must give him all the assistance he can. If he insists on upgrading Hammond, he is doing exactly the opposite. He is putting manufactured obstacles in the way of Al arriving at maximum production. No responsible executive would embark on such an absurd and dangerous game. That sort of treatment breeds indifference in a foreman who feels a vote of no confidence has been passed on him. If Al's production from Hammond is called in question at any time, he has a convincing explanation at hand. A foreman must

*Since the days of the bangboard–*

Double Diamond Gears *have been extensively used in farm machinery. There can only be one reason: their ability to withstand the rigors to which farm machinery is exposed. If you are looking for Double Diamond quality why not discuss your application with one of our gear engineers? Write.*

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**MANUFACTURING COMPANY**
**RICHMOND, INDIANA**

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Polishing, Buffing, Grinding, Filtering Equipment that automatically cuts your costs.

always be listened to and must always be treated as a responsible executive, as indeed he is, and must be given wide powers of discretion when quality of labor is at stake.

Presumably, Al's production results will make or break him in the eyes of the big shots. He is not likely to risk their displeasure by upgrading an operator in whom he has no faith and who might let him down. Ed's argument that the company provides an instructor, and that Hammond would be working under supervision, does not take us very far. He probably had the instructor in mind when he thought a year would pass before Hammond could be put on his own. A year is a long, long time to a busy foreman eager to deliver the goods and I, for one, would not fault him for preferring a bird in the hand. Upgrading apart, Al points out that the company expects foremen to get the best available men for the work and he wisely goes for the highly skilled, ready-to produce outsider. That attitude is the commonsense one.

Harrison and Ed have taken the wrong turning. Harrison hesitates to support Al who knows what he is about, and Ed is full of dark forebodings and woolly doubts. He can't see the wood for the trees. He seems to be obsessed with the fear "If you discourage the men now, there may not be anyone around in the future to be promoted." That's sucking sorrow through a long straw. I wonder that any firm had the courage to offer a foremanship to such a pessimist.

Because one man is passed over, is no reason why all the others need feel despondent. I should think it would be the other way round. If

*"It's good to see some men can keep their heads in the mad scramble to get ahead."*

upgrading is reserved for those who merit it, the men are likely to value it more and to vie with each other in deserving it, than if it is something that happens automatically because of length of service or some other reason not connected with merit.

Those who regard advancement, without effort or ability, as one of the human rights, leave me cold; I've no time for them. My money is on Al. As foreman, he does not think Hammond values for upgrading, and says so. Harrison is timid and shortsighted, and Ed is in a dense fog.

I Y Parkinson
*Northants, England*

WE ARE living in an age of specialists; training and preparation have greater and greater significance.

A few centuries ago a man was old at 30. Today there are positions in the shop where a man is just becoming well versed in his work at this age. Man is more and more productive but it requires more and more training to fit into the production picture.

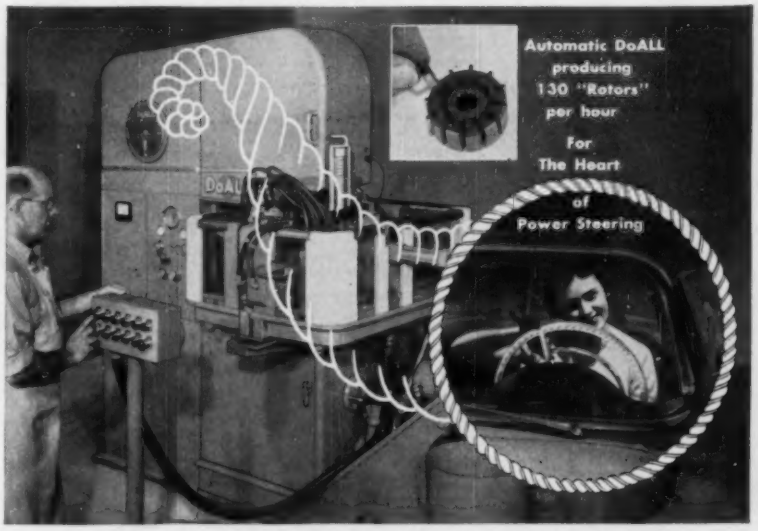
If we could find the "completely trained" mechanic we would have a man who could stand, as master, in the middle of a shop filled with all the machines and skills which man has devised from the earliest times. Such an imaginary picture shows the ever present possiblities for self-improvement.

The company that inaugurates a training program is taking the best possible action to insure not only its future growth but also its very existence, for modern industry is becoming more and more a race between education and catastrophe.

The inception of a training program is the first step, and it is a big step, but much more is required. At the present advanced stage of technological development it is foolhardy to withhold the training until the occasion arises when a trained man is needed.

There was a time when life and work were simple and a man could learn as he went along. It was possible for a nation to prepare and wage a war on short notice but it is not so today. The outcome is determined to a large degree years before hostilities start by the activities in the shops, the laboratories, and the schools. The company that would stay in operation must prepare for the future and it must do it now.

An organization is not a static


*Automatic bandsawing machine* indexes, slots and ejects 130 power steering pump rotors per hour.

# Cornucopia: 1957 Style

During the 10 years just past, the U.S. horn of plenty flowed more freely than ever before. Production increased an astounding 42%. The number of families owning homes jumped 38% . . . cars 60% . . . refrigerators 113%.

This growth occurred with but an 18% increase in employment. The catalyst? More and better tools that have increased human productivity by 19% since 1946.

Can such economic growth continue, with population increasing faster than the number of people available for employment? The answer lies in the extent to which industry invests in new tools to increase human productivity and reduce manufacturing costs.

The tools are available. The completely automatic band-sawing machine pictured above is an example. It slots rotors for automotive power steering mechanisms. The operator simply places the rotors in the loading chute. The machine automatically indexes, slots and ejects completed parts, three at a time. Production is more than twenty-one slots per minute. Labor cost is half that required with the previous machining method.

The application of band machining to high speed production of duplicate parts is an entirely new concept. It has been made possible by development of powerful, rigid, automatic machines . . . and new high speed steel saw bands which will cut up to ten times faster and last up to thirty times longer than those previously available. As a result, thousands of slotting, splitting, notching and cut-off jobs now can be done faster and cheaper than ever before.

In more widespread use of such improved tools lies the way to even greater abundance. Management, labor and government should be inseparable in pursuing this goal.

Advanced concepts of sawing, grinding, lapping and gaging are the particular contribution of The DoALL Company to increased human productivity. The company markets more than 1500 machine tool, cutting tool, gaging and supply items through a network of 38 sales-service stores. Information and machine demonstrations available upon request, without obligation. Call DoALL locally or write.

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thing; it is manned by humans who are constantly aging and approaching retirement. There are no "permanent" employees in the full sense of the word.

A training program should be designed to prepare employees for promotions in advance. There should be understudies for every type of job in the organization. These people do not need to be completely trained but they should be versed in the basic principles of the positions ahead of them.

In this way the company will have a reserve group right in its regular working force, ready to advance when the need appears. By building the training program on this principle the organization can be assured of continuity and at the same time create incentives and future hopes for the employees.

Ernest Jones
*New York, NY*

NIETZSCHE is credited with having said that "Every step the human race takes forward is at the cost of mental and physical pain to someone." If outside help on a boring implement will improve production, why wait? The point in question is whether a profit-making organization should increase its earnings at an early date by hiring a new employee or whether it should procrastinate for the purpose of catering to the feelings of one of its own members. It is true that management shouldn't ignore consideration of the human element, but neither should it be impractical.

Experience points to the advantage of bringing trained personnel onto the scene as soon as possible. To begin with, the man who has already been retained on his present job for some time is evidently fairly satisfied with his current duties, otherwise he wouldn't have remained at them. He might not be to keen on being left out when an increment is about to be made, but neither were some of the laborers in the vineyard satisfied when those who were hired late in the day were given the same amount of money. Nevertheless, all received what they bargained for.

Meanwhile there is every incentive for this fellow to continue with the thought of attending school. The fact that there is a need for a man at present, whereas there was no need for him a year ago, indicates the possibility of a need for double the amount of labor in a year's time. This means that it is possible for both the desire of the employer and that of the employee to be satisfied in due course of events.

Neal A Mack
*Belle Harbor, NY*

## PEACHES AND CREAM

*Would a worker appreciate a birthday or "get well" card sent to his home by the company? Or would he be more inclined to look on such a thing as foolishness, and prefer to be remembered in a more practical way?*

LIFE CAN be cruel. It is a hard world. Yet, the hardness and the hash of life can be made bearable, and often pleasantly so, with a kind word and a tasty dessert. The tough, rough, fierce, competitive struggle to earn a living, to expand an enterprise, to become important, is only worthwhile when the hard, logical man becomes soft and thoughtful.

Workers must have high morale. Men are boys at heart. A boy will eat his spinach to get to his dessert, the peaches and cream. An industrial worker will put forth a greater effort when peaches and cream are added to his rewards.

In themselves, peaches and cream are a small item. Yet, the birthday greeting which we call peaches and cream, may be an incentive to that little extra effort which distinguishes the ordinary competitor from the champion. Knowledge, ability, training, talent does not make a champion. That which is essential is the will to win. The industrial worker becomes a willing worker when he feels important. A birthday greeting will make him feel important. It certainly won't make him mad.

As one novelist points out, in war

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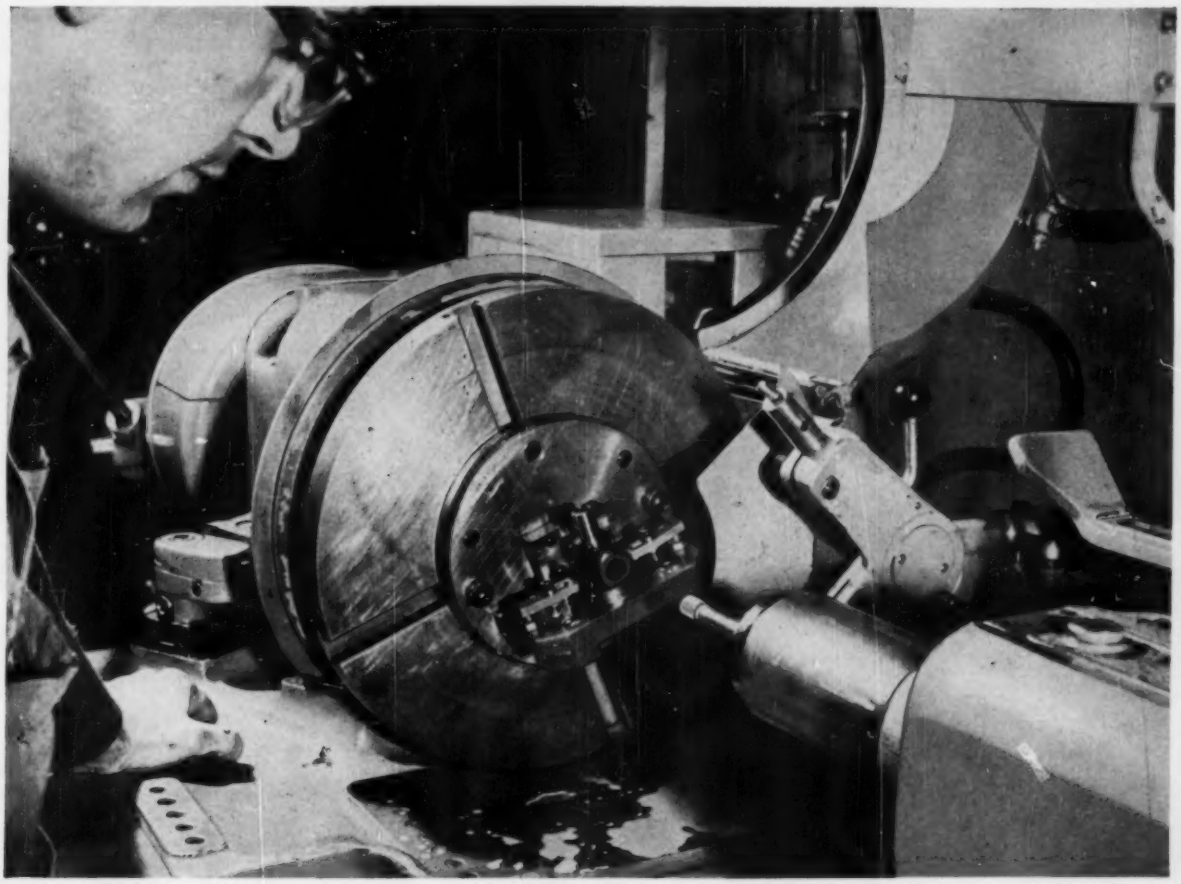

# "Everything they claimed and then some..."

That's Mr. Gerald H. Buchholz talking. He's owner and manager of the Federal Tool and Instrument Company, Corona, New York, and he's talking about his No. 1116 Bryant Internal Grinder.

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## make decisions, but
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or in peace it is not planning, not material, not organization, but the spirit to win that leads to victory. Persistence and determination are characteristic of a spirit to win. These qualities are developed by the little things in life, a smile, a cheerful word, by peaches and cream.

Peaches and cream can have their place in industrial management. The building of morale is essential to dynamic competition. However, the building of morale is but one of many, many things which management must consider. If money is available for morale building, the sending of birthday greetings to all employees might be a good investment.

The sending of birthday greetings appeals to me. The psychology of the individual is much easier to cope with than the psychology of the mob. A birthday greeting appeals to the individual. Make a man feel important and he is your man. That's what I like about peaches and cream.

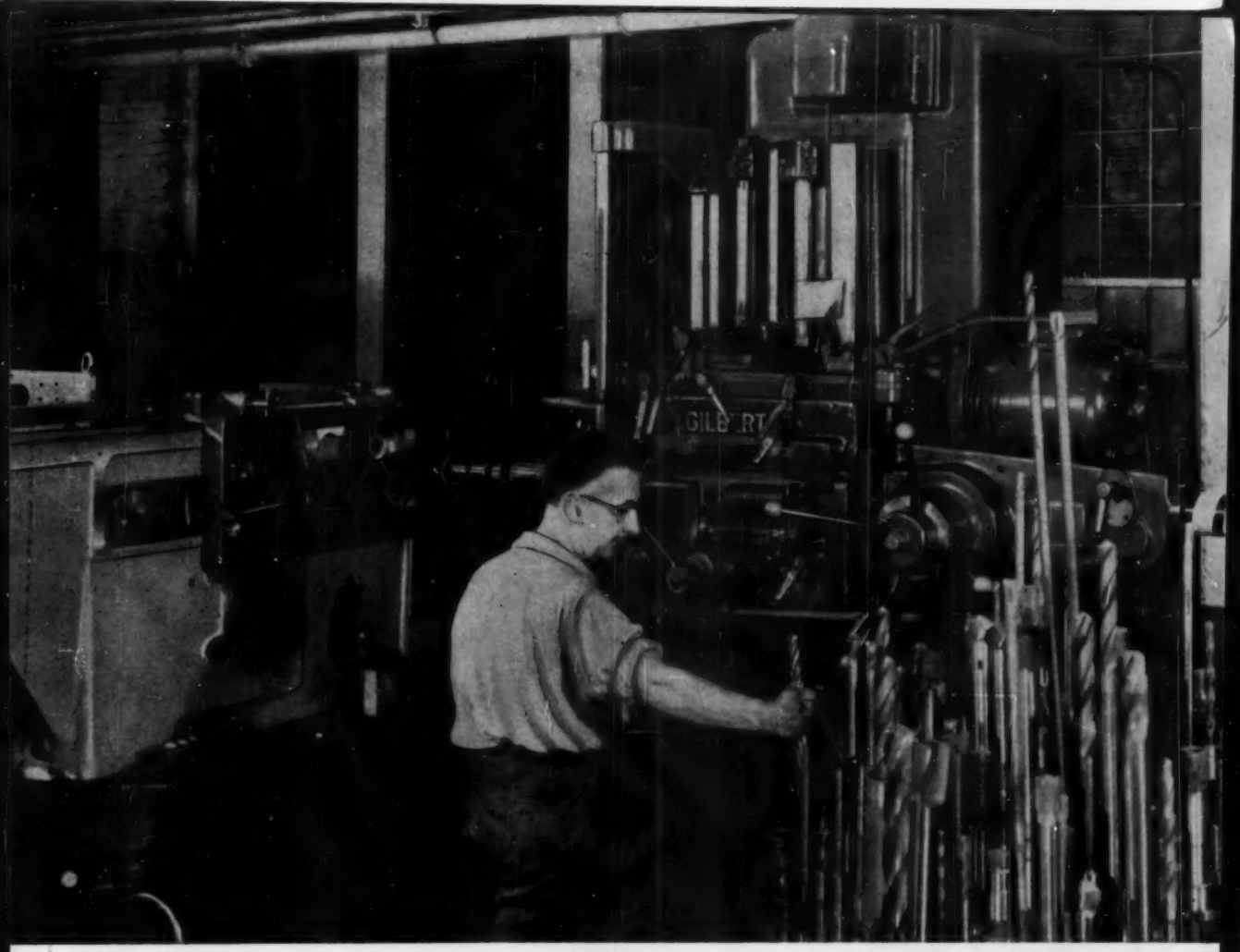
Peter A Seward
*Swampscott, Mass*

### FISHIN'—FOR SKILLS

*If there's no one currently qualified in the shop to run a particular machine, is it good management policy to bring in an experienced operator from outside? Or should an inexperienced inside man be upgraded and trained for the job?*

IT IS A question in my mind as to whether Al hasn't been somewhat negligent in not preparing himself for such an emergency. When a great need arises, such as the one confronted by Al, his apparent lack of foresight results in a situation wherein he has to make rash decisions when time is of the essence. I have always felt that a foreman should be objective—he should stand off at a distance, as it were, and give thought to the possibilities likely to

*"Yes, Roberts, I heard the rumor that you were being passed over for promotion—I started it."*




*courtesy Brown & Sharpe Mfg. Co.*

# Brown & Sharpe cuts time 75% with Gilbert boring mill

"The handling time on this job has been reduced by 75% and the machining time has been reduced by 40%," says T. R. Buckles, Equipment Engineer for Brown & Sharpe Mfg. Co.

These profitable savings were earned by fitting a Cincinnati Gilbert boring mill with a Gilbert revolving table, adjustable on runway, and traveling tool holder designed by Brown & Sharpe.

There are about 180 holes in the workpiece. The boring mill performs drilling, reaming, tapping, or boring operations as well as some milling cuts. The job was formerly done on a radial drill, portable drill, and floor type miller.

This is another typical example of the time saved (and profits earned) by Cincinnati Gilbert horizontal boring mills. Our man will be glad to show you more examples.

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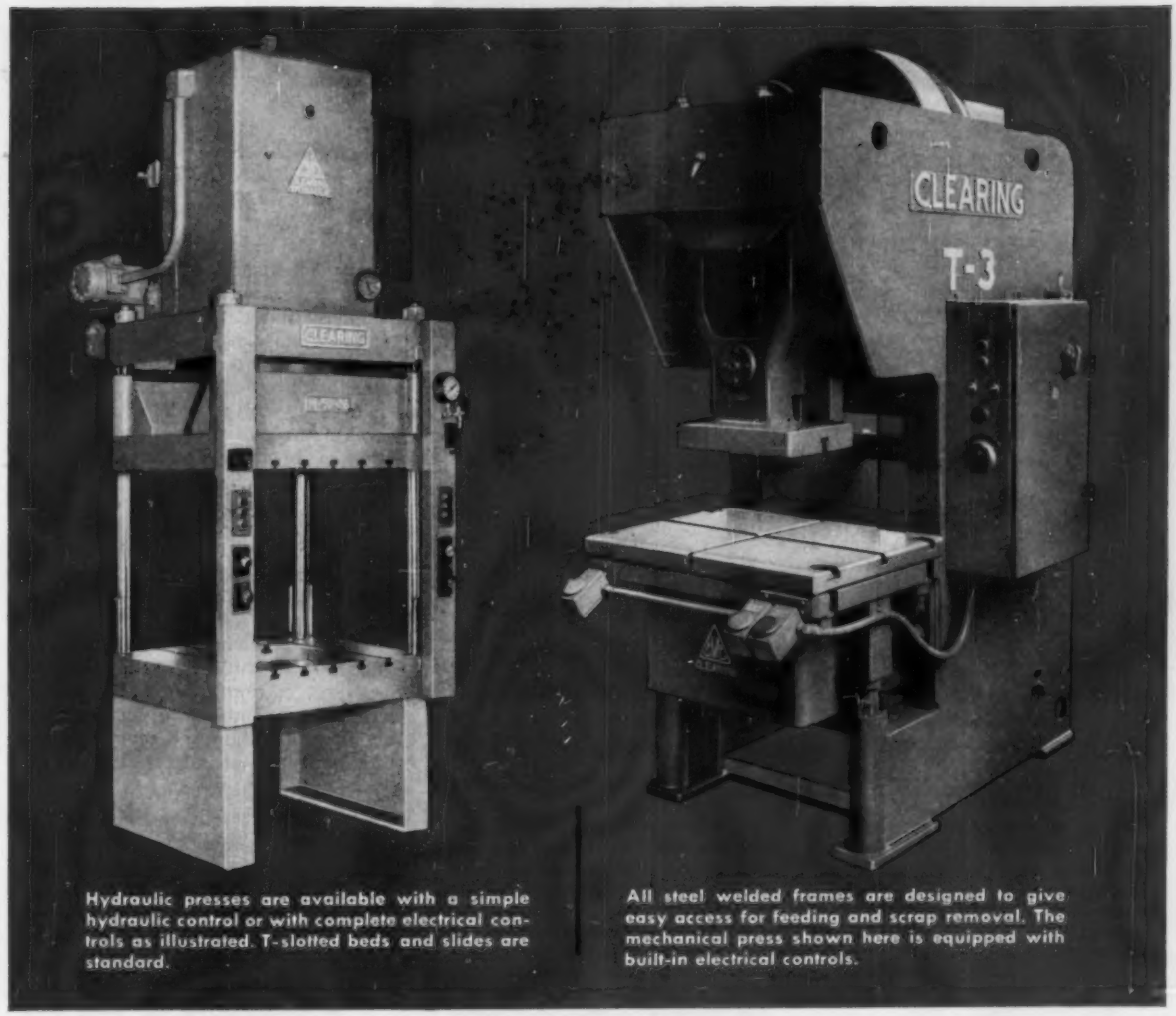
disrupt his schedule of constant production.

While there are some advantages to a newcomer being brought into the shop the fact remains that proper preparation is imperative if the one responsible for the output wants to maintain a well lubricated organization. With all respect to the well qualified outsider, who is no doubt equipped with considerable experience and manipulative skill, consideration must be given to the possibilities of one of the present members of the force being able to take over in an emergency.

As I contemplate the multiplicity of applications relative to the horizontal boring mill I am convinced that its effective operation requires a man of exceptional skill and one who has had a great deal of experience on a diversity of jobs. Experience can be acquired the hard way wherein the operator travels around to different shops wherein he can be subjected to various jobs. Although he might possibly acquire his experience vicariously through observation and study, there is no substitute for one's credentials earned in the college of hard knocks. A wide-awake individual with a keen mind and a willingness to use up some of his own time at night in intensive study could overcome the handicap of not having past experience if he were to set his mind to it.

What kind of an executive is Al that he would permit one of his men to interfere with his judgment on what is necessary for the good of the department? If a foreman is going to permit himself to be swayed by complaints from bellyachers he'll soon find himself unable to master his own mind. Hammond is not a boring-mill hand, and the need for an operator is urgent, so why not set the guy back on his heels by letting him know who is running the show? If the man is so hepped up on his ability to handle the job then let him put in an application for it and his opportunity will come around in due time. Why wait for Harrison to tell the fellow off, Al; aren't you the bull in your own woods? I believe in doing everything to keep up the morale of the shop but there are times when an executive must make it known that he's at the head and it is up to him to make important decisions. I think you'll find, Al, that if you make it known by exercising your authority in a painless but definite way, that the boys will cooperate.

Harry Fort
*Port Arthur, Ontario*




Hydraulic presses are available with a simple hydraulic control or with complete electrical controls as illustrated. T-slotted beds and slides are standard.

All steel welded frames are designed to give easy access for feeding and scrap removal. The mechanical press shown here is equipped with built-in electrical controls.

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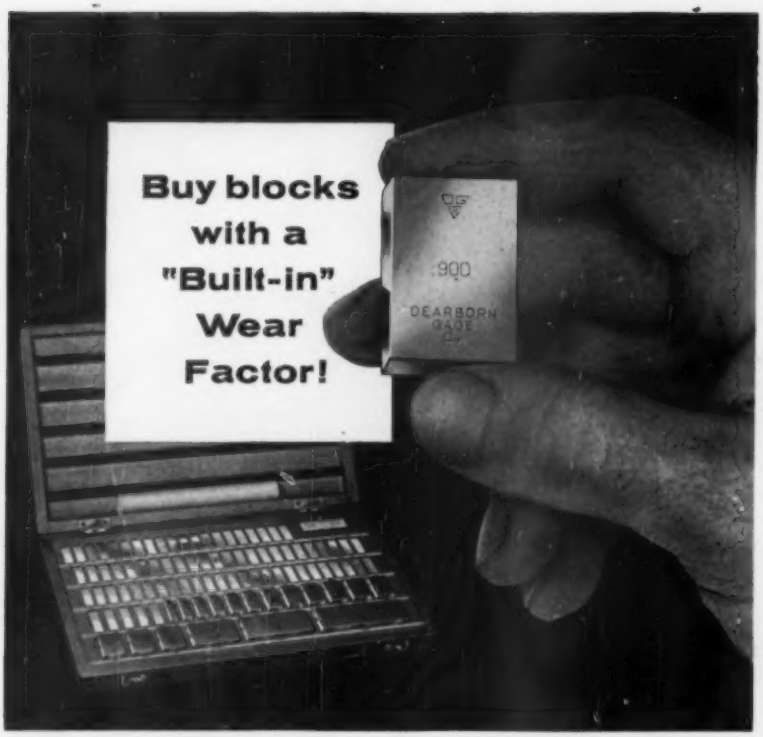


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# NEW BOOKS...

INDUSTRIAL ORGANIZATION AND MANAGEMENT *[3rd Edition] — By Ralph C Davis. Published by Harper & Bros, 49 E 33 St, New York, 16, NY. 825 pages 6 x 9½ in. Price $8.25.*

One of the most comprehensive surveys of management principles, this work has recently been revised for the first time since 1940; as a result, it is virtually a new book. The book does not advocate any particular "system," but emphasizes the fundamental objectives, policies, and general methods of approach to the solution of business problems.

Thirty-one chapters — ranging in content from a historical discussion of management principles to the latest innovations in automation, quality control, and process planning— present as exhaustive a survey of modern management as can be found anywhere. The book is recommended not only to students of management (a text edition is available at reduced cost) but also to businessmen who want a thorough review of the fundamentals of industrial organization.

•

BORON, CALCIUM, COLUMBIUM AND ZIRCONIUM IN IRON AND STEEL. *Fourth book in new monograph series on alloys of iron. Published for the Engineering Foundation by John Wiley & Sons, Inc, 440 Fourth Ave, New York 16, NY. 533 6 x 9-in. pages. Price, $14.*

These monograph series provide comprehensive summaries of available data, as reported in the technical literature of the world, on the effects of selected metals on carbon steels, alloy steel and cast iron. Six authorities collected and wrote the current volume. Each of the sections is supplied with a very extensive bibliography.

To the engineer and metallurgist, a book like this one is a great help, because the basic facts and observations developed by many people are put into proper perspective. Take boron, for example. Boron steels became a commercial entity before the fundamental effects of the alloying element were known. No other element has comparable effects on heat-treating characteristics of steel in minute amounts — as small as 0.0005%. But boron is effective as a hardening agent for the low-carbon

and medium carbon steels. Because boron increases hardenability, larger sections of steels containing boron can be hardened than steels of the same composition without boron. Commercial experience with a large variety of finished parts made of medium-carbon boron steel has indicated that a boron steel is a satisfactory substitute for higher-alloyed steels, provided the part has been heat-treated to have a structure of at least 90% tempered martensite to a certain minimum depth. That depth depends upon the stress distribution in service. Response of boron steels to case-hardening treatments is variable, and evidently they are unsuitable for carbonitriding.

There is a great deal of practical information packed into these monographs. The search for low-alloy materials suitable for a variety of uses is based on economic factors. Hence, the practical engineer and the metallurgist need this volume as a guide to selection of materials and subsequent processing—heat heating, forging, and welding.

•

FINANCIAL APPROACH TO INDUSTRIAL OPERATIONS—*By Alvin Brown. Published by Research Div, Society for Advancement of Management, 74 Fifth Ave, New York 11, NY. 23 pages, 5½ by 8½ in. Paper cover. Price $1.50.*

Some of the basic principles of financing are discussed in this short paper, written by the vice president of finance of the Johns-Manville Corp. Concise and clearly written, the paper should bo of interest to anyone seeking a simplified introduction to the subject. The need for analysis of financial operations in modern industry is stressed, and some of the intricacies of decision-making are pointed out. The author's purpose at all times is to orientate, using broad principles, rather than to explain intricate details or specific cases.

•

MECHANISMS AND DYNAMICS OF MACHINERY—*by Hamilton H Mabie and Fred W Ocvirk, associate professors of mechanical engineering, Cornell University. Published by John Wiley & Sons, Inc, New York, NY. 422 pages. Price $8.50.*

This textbook for college undergraduates is divided into two parts and is intended for two consecutive


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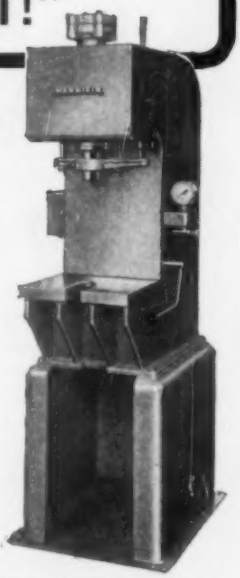

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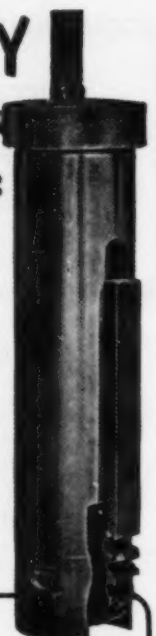
The INSIDE STORY about NATIONAL Keyseating Millers



**NATIONAL** Keyseating Millers are designed for milling internal keyseats . . . in one cut . . . in offset holes . . . with parallel sides . . . partly through holes . . . of standard width and depth . . . in holes that are closed at one end . . . and many other operations. A demountable guide on body of Miller enters keyseat being milled assuring straight keyseat in perfect alignment with the axis of the bore, thus making it unnecessary to clamp work to drill press table.

**CUTTERS** are made from high speed steel which are hardened to Rockwell specifications and accurately ground to size. Tops of teeth are staggered to break chips which reduces strain and wear on both cutter and driving pins. It will pay you to put National Keyseating Millers on the inside of your next keyseating job.

national MACHINE TOOL CO.

CINCINNATI 22, OHIO

WRITE TODAY for Catalog No. 17 complete, handy size


courses. It is assumed that the student beginning Part 1 (Mechanisms) has completed courses in physics and calculus and that the student beginning Part 2 (Dynamics of Machinery) has completed courses in statics and dynamics.

The authors have made an effort to streamline the elementary work and to give more time to interesting advanced subjects including analytical cam design, non-standard spur gears, computing mechanisms, synthesis, and vibrations.

Other subjects covered by the text are, in Part 1, linkages, cams, gears, and gear trains, and in Part 2, kinematics, force analysis, and balance.

The book is illustrated with a great many line drawings and diagrams, as well as photographs of practical applications. A number of appropriate problems is provided at the end of each chapter.

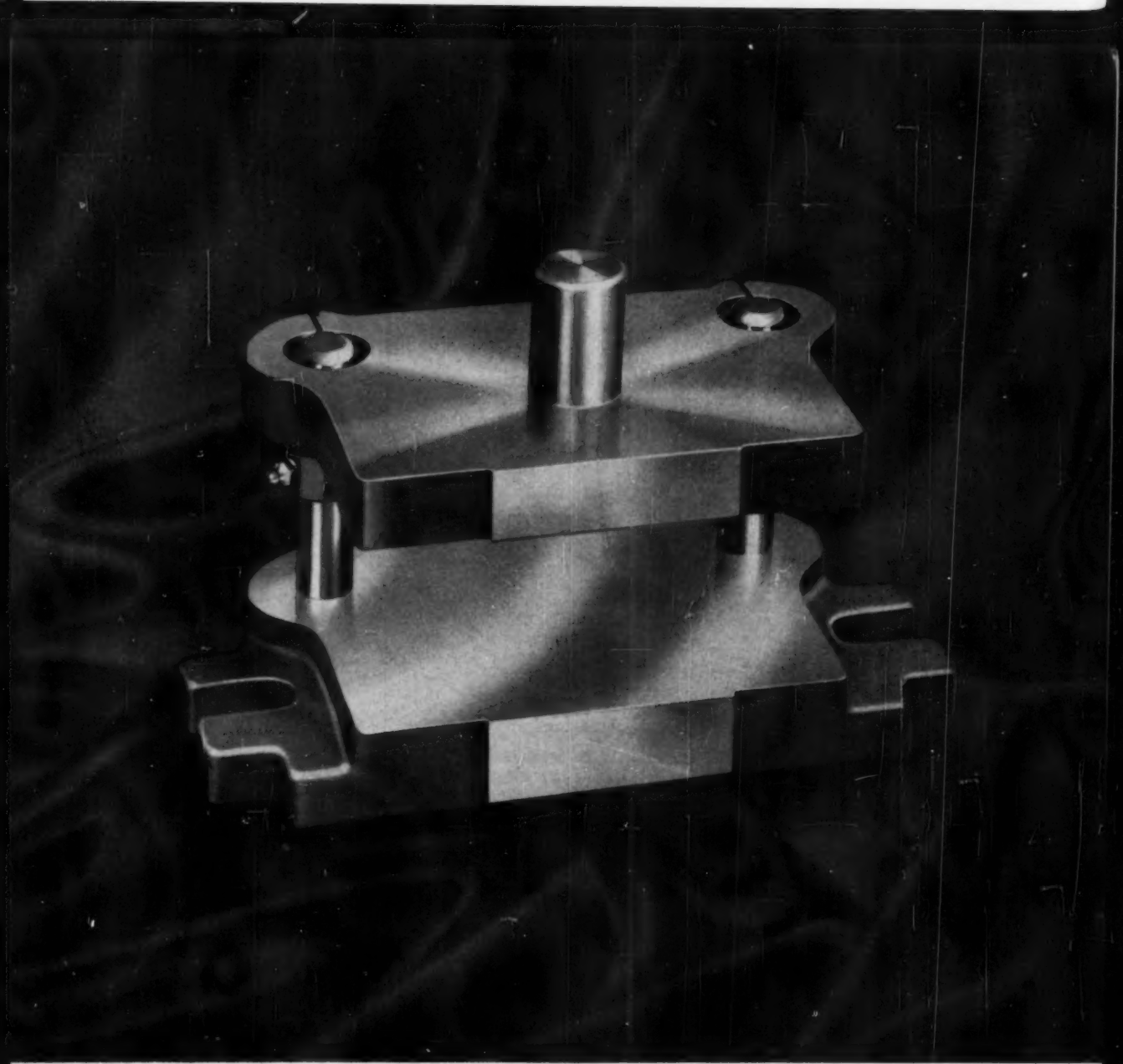
•

THE DYNAMICS OF CAPITALISM — *By Julius T Wendzel. Published by Harper & Bros, 49 E 33 St, New York, NY. 175 pages, 5½ by 8½ in. Price $3.50.*

A guarded optimism is the prevailing tone of this book. It is Dr Wendzel's thesis that "booms and deep depressions (in contrast to surges and plateaus of growth which we consider normal under capitalism) are neither normal nor necessary in our type of economy." What can be done to avoid depressions, and what our attitudes must be toward the capitalistic system, are the chief problems that the author seeks to explain.

Tracing the linkage between owners of capital and the enterprisers who provide new business ideas, Dr Wendzel argues that imaginative enterprisers must have access to adequate capital. More attention should be given to increasing the strength of new and young enterprise, and to rechanneling capital to new businesses, the author feels. Certain governmental policies pertaining to new enterprise and credits should be modified.

Those who think of economy as essentially static, or tending toward stability, will find an effective opponent in the author, who feels that America's rapidly increasing population and the resulting increase in demand for goods must inevitably force the enterpriser to adopt more dynamic attitudes, if the capitalistic system is to survive.



# THIS IS RIDICULOUS...

No one but a photographer ever saw a die set as shiny-bright as this one. If it's not being worked on in the tool room, usually it's buried away in a punch press, covered with oil and dirt, banging out piece after piece day after day.

And each one of those pieces is just like the others within a few thousandths of an inch. That's precision, the secret behind the success of mass production.

That's the reason for the die set's existence—to aid in maintaining precision just as long as possible. To do that, it has to be precision built.

Factory-assembled and factory-inspected, Detroit die sets meet the most important requirement of a die set, precision, in their parallelism, squareness and finish. High-quality materials plus more than ample size maintain that precision.

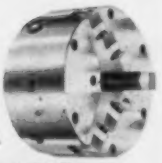
Over 2000 standard, stock die sets are detailed in Detroit Die Set's new catalog. Details on specials and accessories, too. Ask for it on company letterhead, or call your local representative.

*OFFICES IN PRINCIPAL INDUSTRIAL CENTERS*

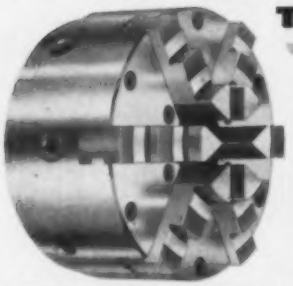
**Detroit DIE SET CORPORATION**

2895 WEST GRAND BOULEVARD • DETROIT 2, MICH.

**Next time you buy scroll chucks... get these *Buck* features.**



**They cost no more.**



Dead true precision adjustment *within 1 minute* . . . guaranteed precision of .0005" chucking duplicate parts *without* adjustment . . . compensation for spindle run-out . . . longer lasting accuracy! Production-wise and cost-wise you can't beat Buck Ajust-Tru values.

**MOUNTING PLATES:**

**American Standard A-1 and A-2; Camlock D-1; Long Taper Key Drive Type L; Threaded; plus mountings for grinders and special machines.**

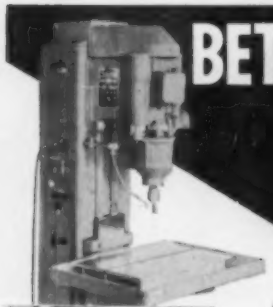
**SIZES:**
4" 5" 6" 7½"
8¼" 9" 10" 12"

Buck Ajust-Tru Chucks were the *first* precision universal scroll chucks and none of the imitations provide all the Buck features that give you quick set-ups and higher production rates. That's why it pays to chuck with Buck.

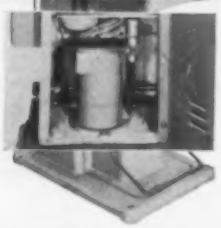
If you aren't thoroughly familiar with the Buck Ajust-Tru patented principle and why it made precision chucking possible with scroll chucks, the catalog will give you full details.

**WRITE FOR COMPLETE BUCK CATALOG**

**BUCK TOOL COMPANY**
910 SCHIPPERS LANE • KALAMAZOO, MICH.



**BETTER** IN DESIGN IN OPERATION
**RUTHMAN GUSHER**
**Coolant Pumps**



Illustrated is a Snow Manufacturing Co. Single Spindle Vertical Full Universal Tapping Machine equipped with a Gusher Pump.

Simple in design with fewer moving parts to wear, Gusher Coolant Pumps will give you year after year of very efficient service at very low maintenance cost. The pre-lubricated heavy-duty ball bearings require minimum attention. The electronically balanced rotating assembly eliminates vibration. Always specify Gusher Coolant Pumps for a trouble-free coolant system.

Type 1 P-3 Short

**THERE'S A GUSHER FOR EVERY REQUIREMENT**

**Write today for catalog**

**Ruthman MACHINERY CO.**

• COOLANT PUMPS
• CIRCULATORS • AGITATORS
• MOLTEN METAL PUMPS

1818 Reading Road Cincinnati, Ohio


## NEW FILMS...

THE MILLERS THAT USE THEIR HEADS. *Produced by The Robert E Morris Co, West Hartford 7, Conn. 16 mm, sound, color. Running time 24 min. No charge.*

Production line sequences show Nichols millers ingeniously tooled for automatic and semi-automatic operations on a variety of parts in users' plants. Single-spindle, duplex, and Twin Mill machines are featured, but brief shots also show uses of hand-operated mills.

The film should be of interest to tool and production engineers, and to other personnel concerned with high-speed, high-precision milling of small parts.

•

HOLD IT. *Produced by Huck Mfg Co, 2480 Bellevue Ave, Detroit 7, Mich. 16 mm, sound, b & w. Running time 12 min. No charge*

To describe the application of conical Keystone Lock blind rivets to aircraft structures the assembly of typical airframe units is shown. Animated drawings and slow-motion close-ups are included to give a thorough understanding of the driving cycle of the Huck CKL blind rivet. In-plant shots are included to show steps in the manufacture of the rivets and quality-control methods employed.

•

HONEYCOMB REPAIR. *Produced by the Martin Co, Presentations Section, Baltimore, Md. 16 mm, sound, color. Running time 10 min. No charge.*

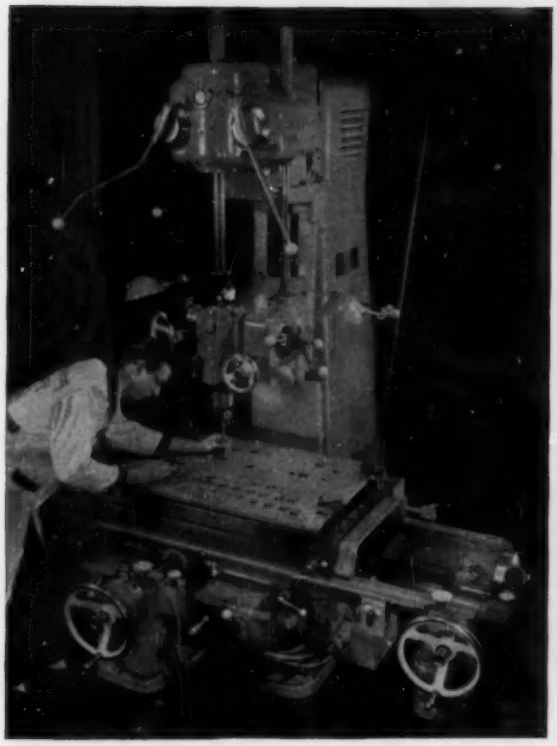
Repair of aluminum honeycomb structure under field conditions is demonstrated. A six-inch puncture in an aircraft wing is repaired by two men whose tools and equipment are all carried in a single cart. By reducing the four-hour operation to 10 min, all the essentials are clearly shown. Cleanliness is stressed throughout the four basic steps: removal of damaged material, application of adhesive in the void, bonding a patch over the hole, and checking the bond.

# **BUY** Precision **THAT FITS...!**

for tenths
**YOU NEED A**
**CLEEREMAN JIG BORER**

*OR*

for .001"/foot
**YOU NEED A**
**LAYOUT DRILLING MACHINE**



If your work involves gages, jigs, fixtures, or "jigless" production with ultra-fine tolerances, one of the three models of Cleereman Jig Borers is the answer.

But when your work calls for tolerances of .001" per foot, the economy of the Layout Drilling Machine is the "common sense" approach to your problem.

**There are installations near you. Your Cleereman distributor can answer your questions and arrange an inspection visit for you.**

BRYANT
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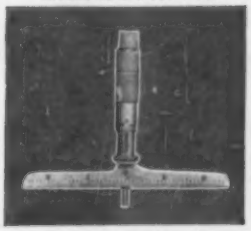
**CLEEREMAN MACHINE TOOL CORP.**
GREEN BAY, WISCONSIN

CHROME CLAD STEEL TAPES



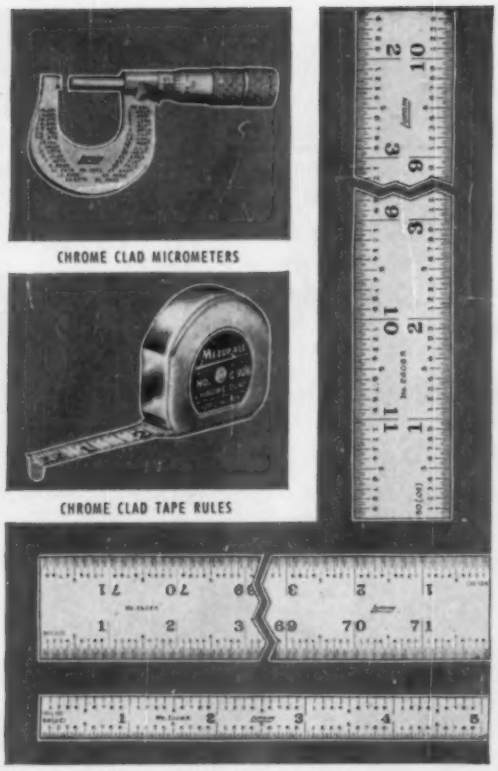
CHROME CLAD MICROMETERS



CHROME CLAD DEPTH GAGES



CHROME CLAD TAPE RULES



CHROME CLAD MACHINE DIVIDED RULES

**SPECIFY**

**LUFKIN Precision Tools**
**WITH**

# CHROME CLAD®

**THE SUPERIOR FINISH**

- Non-glaring . . . reduces errors, saves time by making graduations easier to read
- Reduces tool maintenance because it resists perspiration, rust and corrosion
- Reduces tool costs because it wears longer, will not chip or peel off

**BETTER MEASURE WITH LUFKIN**

**TAPES • RULES • PRECISION TOOLS**

**THE LUFKIN RULE CO., Saginaw, Mich.**

485

**IT PAYS TO USE YOUR INDUSTRIAL DISTRIBUTOR**
*. . . He can cut your stockroom costs*


## NAMES IN THE NEWS...

**William A Minnix** has been named chief gage engineer of Freeland Gauge Co, Detroit. Prior to joining the company Mr Minnix was associated with the Delco Products Division of General Motors, Dayton, Ohio, as head of the gage engineering department.

**Leonard R Cervenik,** employee relations manager of the Axle Division of Eaton Manufacturing Co, Cleveland, has been promoted to factory superintendent of the Heater Division.

**Malcolm M Schwartz,** formerly production project manager for three fire control system programs at RCA, has been appointed production manager of the Camden, NJ, plant of G-L Electronics, maker of tape wound cores.

**Charles B Morgan,** superintendent of molding, and assistant manager of production at Synthane Corp, Oaks, Penna, manufacturer and fabricator of laminated plastics, has been promoted to general manager of production. He succeeds **Duane E Roland,** who has retired.

**William E Vogel** has been appointed assistant manager of Atlas Drop Forge Co, Lansing, Mich.

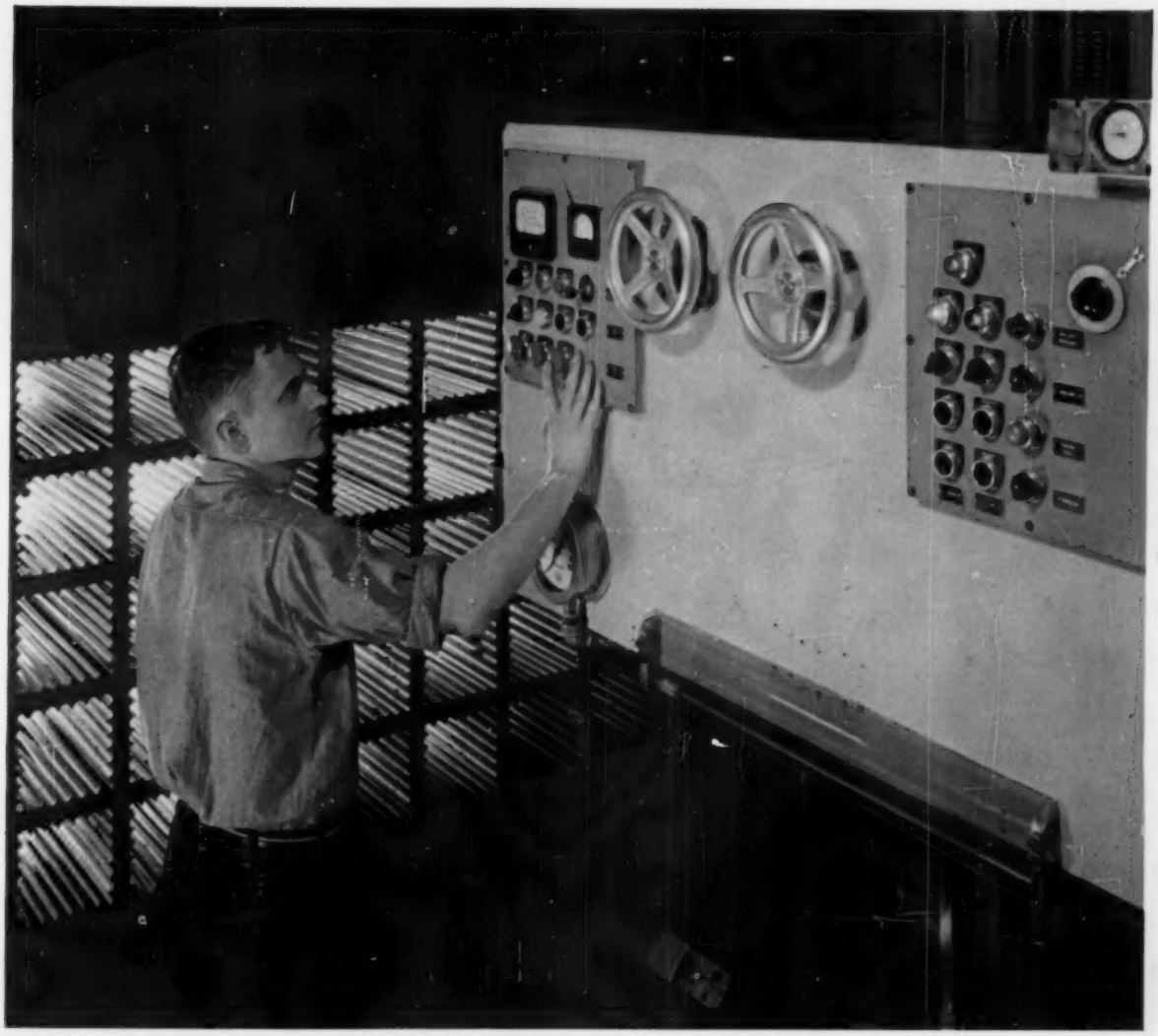
**Edwin R Gamson** has joined Telemeter Magnetics, Los Angeles computer memory producer, as director of manufacturing. He was formerly associated with Autonetics, a division of North American Aviation.

**Harold G Hynd,** vice president general manager of Douglas Aircraft's Tulsa Division, has been named general manager of the El Segundo Div, succeeding **T E Springer,** who has retired.

**Robert L Bub** has been elected vice president, chief engineer, and industrial sales manager of Cloyes Gear & Products, Inc, Cleveland.

**Stanley S Krentel,** vice president of MacDermid Western, has been named executive vice president of MacDermid Inc, producer of metal cleaning, plating, and finishing products.

**J E Barber** has been named sales manager of Black & Webster, Inc, Newton, Mass, manufacturer of solenoid-operated production tools. Prior to joining the company Mr Barber was associated with Kendall Mills in product development activities.



## HERE'S THE LAST WORD IN DEEP HOLE DRILLING | WITH *MINIMUM* DRIFT

This Westinghouse Atomic Core Plate stands almost seven feet high, is eighteen (18) inches thick and is made of 347 stainless steel weighing over 30,000 pounds.

The new Canton Tool Deep Hole Driller shown here repeatedly put the 13/16 inch drill through this tough steel to form the six inch square openings, with much greater speed and accuracy than by existing conventional methods. By this method costly material was salvaged, and even more important there resulted a considerable savings of time and elimination of work on the succeeding operation. For drilling with a minimum of drift use a Canton Tool Deep Hole Driller.

We'll do custom drilling for you in our own shop or we'll build a machine for you to serve your specific needs.

**THE CANTON TOOL MANUFACTURING COMPANY** | EAST CANTON, OHIO

E. Howard Perkins, Board Chairman of Brooks & Perkins, Inc., asks you:

# "How fast will our new earth satellite travel?"

"Hundreds of miles high, the new earth satellite will streak through space, circling our globe each 90 minutes!

"But this speed, estimated at 18,000 miles an hour, is achievable only in the remote emptiness above our atmosphere. Down here, the satellite had to travel fast, too, to meet the schedule of Project Vanguard, assigned to the U. S. Navy.

"We have built a number of these satellites on tight production schedules.

"The satellites had to be shipped quickly to the U. S. Naval Research Laboratory in flawless condition, ready for the final metal coatings which make them look silvery. So, we used Air Express which delivered all our shipments without a scratch!

"The fact is that Air Express never fails us. It expedites pick-up and delivery with radio-controlled trucks. Its private wire network can 'keep an eye' on each shipment. Time is saved by Air Express' use of the *first* scheduled plane—there's no wait for full plane loads. Door to door, Air Express carries our valuable products on schedule—every time!"

**Air Express**

**30 YEARS OF GETTING THERE FIRST** *via U.S. Scheduled Airlines*

**CALL AIR EXPRESS . . .** *division of* **RAILWAY EXPRESS AGENCY**

## "These 'super-speed' inclinables give me twice the production . . . at about half the cost!" From their special vibration-absorbing legs to their counterbalanced shafts, these presses are built for speed.

With such special features as bronze gibs...automatic lube systems...special clutches, brakes and flywheels, and equipped with precision feeds, they can knock out short stroke work at better than 500 strokes a minute! They're all new, all Bliss, and the cost is low—surprisingly so.

These are the latest members of Bliss' line—the line that offers industry its most complete choice of types and sizes. And with no axe to grind for any one type, you can be sure of impartial pressroom counsel—by Bliss.

BLISS
SINCE 1857

**E. W. BLISS COMPANY · Canton, Ohio**

*100 years of making metal work for mankind*

PRESSES • ROLLING MILLS • ROLLS • DIE SETS • CAN MACHINERY • CONTRACT MFG.

NOW! THE COUPLING WITH THE 4-WAY FLEX!

# Para•flex

## FLEXIBLE CUSHION COUPLING

***THE NEW IDEA IN FLEXIBLE COUPLINGS... WITH A FLEXING BODY THAT AUTOMATICALLY COMPENSATES FOR ALL COMBINATIONS OF MISALIGNMENT AND END FLOAT... AND CUSHIONS SHOCK LOADS!***

THIS Coupling "swallows up" misalignment! Its ability to handle multiple displacement is exceeded only in a universal joint. It outperforms the most complex coupling mechanisms—yet it operates with the simplicity—*and the dependability*—of a modern tire!

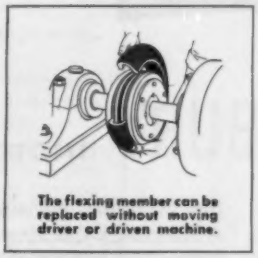
The technological advances that contribute to the miracle of today's truck tires, which are engineered to carry tremendous loads at high speeds and stand terrific shock, have made this new type of coupling possible.

The heart of Para-flex is a tire with synthetic tension members bonded together in rubber. It is pliant. It "fits itself" to changing shaft conditions—angular, parallel, end-float, *or any combination of all three!* Depending upon the size of coupling and duration of shaft misplacement, it handles angular misalignment up to 4°, parallel up to ⅛" and end-float up to 5/16".

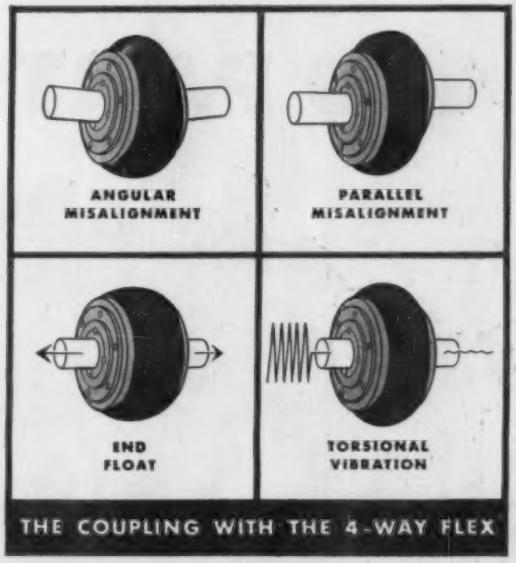
It cushions the stresses of shock loads to a remarkable degree. And it tends to absorb torsional vibration—reducing noise and protecting machinery from vibration's destructive forces.

There is no metal-to-metal contact between shafts. They are insulated. No lubrication is required.

Para-flex takes a minimum of space on the shaft. Mounting is simplified through the use of standard Taper-Lock bushings—no reboring, no machining. Safety is promoted by flush design; there are no protruding parts. And since the flexible member is molded with a transverse split, it can be replaced *without moving either the driver or driven machine!*



The flexing member can be replaced without moving driver or driven machine.




Para-flex Couplings are stocked by Dodge Distributors in popular transmission sizes. They are available from factory stock in capacities up to 600 hp at 900 rpm. Call your distributor for early delivery to *make your own test.* You'll witness something revolutionary!

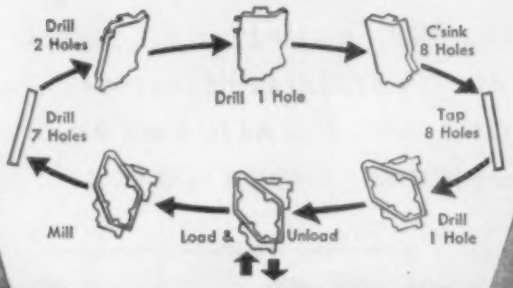
DODGE MANUFACTURING CORPORATION, 100 Union Street, Mishawaka, Indiana

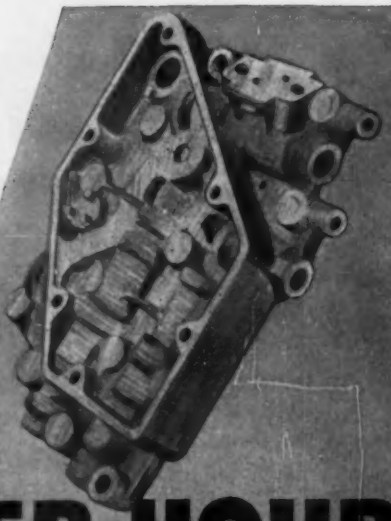
**DODGE**

*of Mishawaka, Ind.*

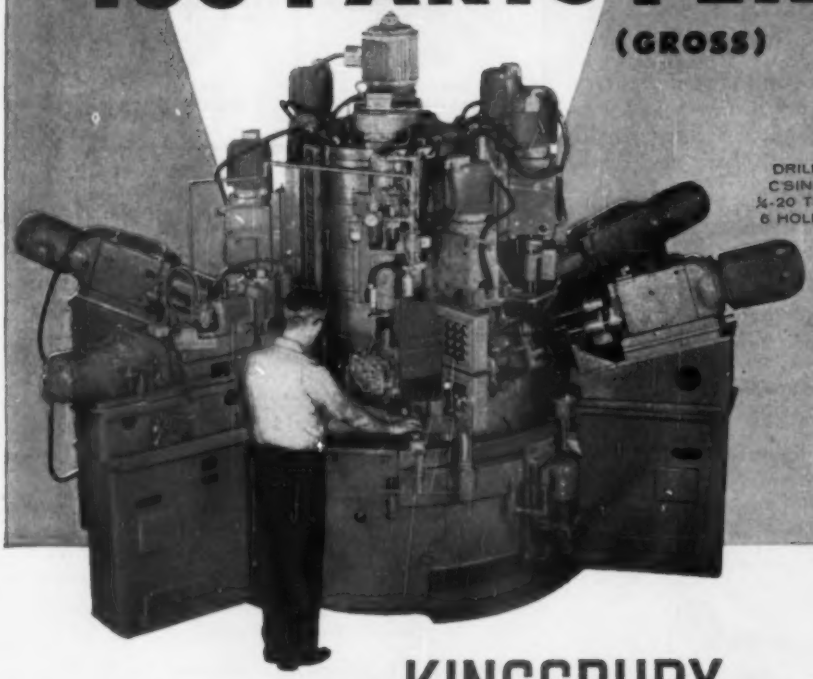
**CALL THE TRANSMISSIONEER**, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new methods. Look for his name under "Power Transmission Machinery" in the yellow pages of your classified telephone directory—or write us.

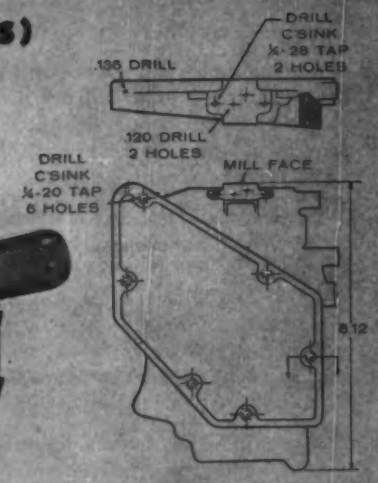
• drilled
• countersunk
• tapped
• milled



# 460 PARTS PER HOUR
(GROSS)






## . . . on this 8-station KINGSBURY INDEXING AUTOMATIC

Eight fixtures are mounted on a 60-inch index table. The part is tipped back in each fixture so that the high speed (7200 rpm) milling operation is horizontal. Five vertical units on the central column operate on the holes in this milled face. Three angular units operate on the six mounting holes.

All units operate at once, while the operator is changing parts in his fixture. He presses buttons to actuate the clamping, unclamping and indexing mechanisms.

A Kingsbury indexing automatic is the best way to perform drilling types of operations

. . . at a high production rate
. . . at low unit cost
. . . with unvarying accuracy.

Kingsbury Machine Tool Corporation, Keene, N. H.

KINGSBURY INDEXING AUTOMATICS for high production drilling and tapping

## Talking About Die Sets

*with*

**Phil Marsilius**

*Executive Vice-President*
*The Producto Machine Co.*

**How to Select and Order a Catalog Die Set**—Do you always order the die set you *really* need for the job...or do you overlook a specification which results in your having to "make do" with the set you ordered or lose time by having to re-order?

Once again, we feel that a simple and basic practice should be emphasized because our daily experiences show that even the most painstaking individual occasionally overlooks one or more factors in preparing to place an order.

**Here is our suggested check-list** for selecting and ordering a catalog die set:

**1. Lay out the die.** Allow sufficient area for feeding devices and auxiliary stock guides that may be required. Determine also what areas must be left clear for part ejection or scrap.

**2. Determine type of set** you need—rear two-pin, four-pin, center-pin, etc.—according to tolerances and construction of die.

**3. Place layout on templates** for the type of die set you have chosen. Select die area that best meets the limits established in Step 1.

**4. Select material** for die set—semi-steel, all-steel or combination—based on the die's strength requirements.

**5. Select thicknesses** of punch and die holder in line with strength requirements and allowable press shut height.

**6. Determine length of guide-pin required*,** based on length of stroke or ram clearance.

**7. Determine type and length of bushing** and material from which it should be made, based on accuracy, speed of operation and required life expectancy of die.

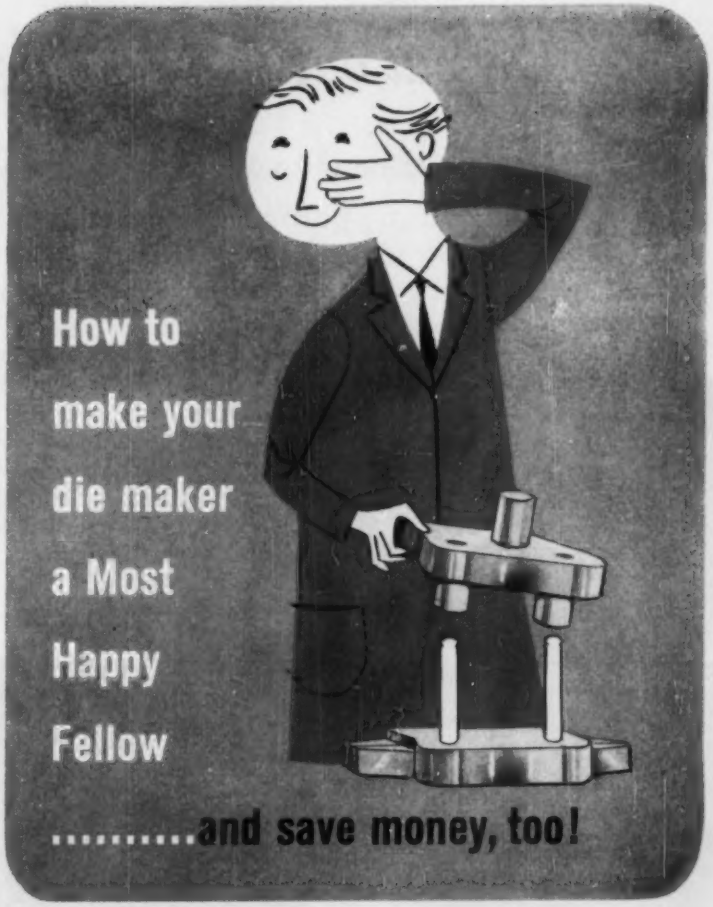
**8. Select shank diameter** for the press on which die will be run.

**9. Choose grade of precision** required—Master or Commercial—based on tolerances and number of pieces to be produced.

**10. Order die set** which meets most closely the above requirements, making certain that *all* ordering information is included: Catalog number and quantity; Master (Precision) or Commercial grade; length of guide pin; type of bushing; diameter of shank or "no shank"; how to ship. Keep in mind that special thicknesses of punch holder and die holder can also be ordered if required.

Of course, you may not find it possible to check these points in the exact sequence presented. However, if you will make it a habit to use this check-list for each die set you need, you can avoid making costly errors in ordering.

*"L" dimensions pertaining to pin length as shown in die set catalogs refer to distance from bottom of die holder to top of pins. They do not necessarily apply to actual guide pin lengths.

It's easy. Just be sure to specify Producto die sets with *Qwik-Fit guide pins.*

Then your die maker will always be able to assemble and disassemble his die sets practically blindfolded! No longer will he have to line up pins and bushings cautiously...tediously hammer die sets together...or pry them apart. With Qwik-Fit guide pins, the die set almost *puts itself together.* The spherical-angular radius on these pins prevents jamming or cocking *regardless of how the punch holder is started on.*

Think of the time your die maker will save...and the money *you* will save. Dies are growing more complex daily and that means assembly and disassembly of the die set dozens of times. In plants all over the country, Producto's Qwik-Fit pins are saving up to 75% of the time formerly required for these operations.

To improve morale and increase productivity, join the growing ranks of die manufacturers and users who specify "Producto die sets with Qwik-Fit guide pins." They are available on Master die sets at no extra cost.

**HOW TO MAKE ORDERING EASIER:**

Get your free copy of Producto's Die Set Catalog No. 11, designed specifically to simplify your selection and ordering job. And ask to receive the idea-filled Die Set Digest, too.

THE PRODUCTO MACHINE COMPANY
875 Housatonic Avenue, Bridgeport 1, Connecticut

Wherever die sets are used
PRODUCTO
PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

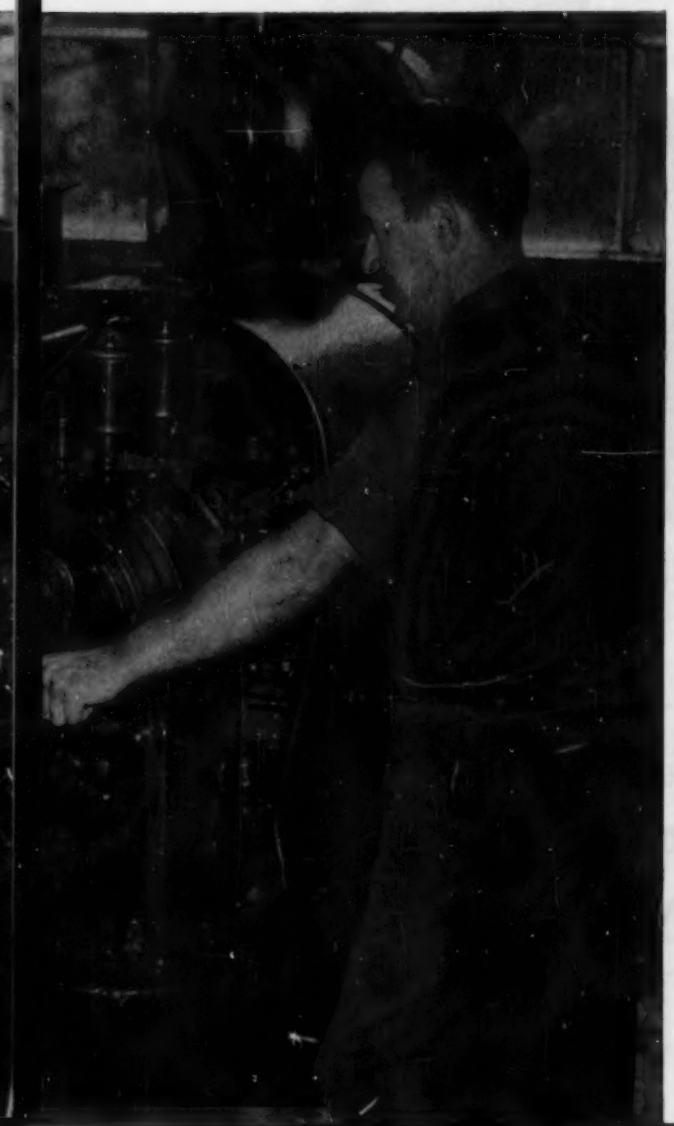
# *They cut out three oils by changing to one...*

Standard Oil lubrication specialist Bob Cleland and plant manager I. G. Smallegan inspect work furnished by operator Dick Stockwell. Giving technical help to customers like this is something for which Bob Cleland is well fitted. Bob has a mechanical engineering degree from Michigan State and has completed the Standard Oil Sales Engineering School.

# STANICUT Oil 166 BC

*Screw machine plant saves on oil inventory and handling, receives other benefits by converting to dual-purpose cutting oil.*

Grand Rapids Metal Products Company's problem was the mixing of cutting and lubricating oils in their National Acme and Gridley screw machines. In all, four oils were used. In some machines a cutting oil, two lubricating oils and a base oil were employed to improve machining characteristics. Lubricating oil leaking past seals mixed with the cutting oil, reducing cutting oil qualities. Oil mixtures were constantly varying, and troubles in tapping resulted.



Standard Oil's Bob Cleland, working with plant management, suggested STANICUT Oil 166 BC. This oil, he explained, is a dual-purpose oil. It can be used for lubrication as well as for cutting, and no dilution of the cutting oil can occur.

**After a week's trial** in one machine, the entire plant was converted to STANICUT Oil 166 BC. Tap troubles were reduced, resulting in much less down time. Spindle speeds have been increased, yet the spindles run cool. Oil inventories have been reduced from four to one.

STANICUT Oil 166 BC does not corrode bearings, gears, bushings, spindles or other machine parts. While STANICUT Oil 166 BC contains E.P. additives, it does not stain copper or brass.

**Get the facts** on how STANICUT Oil 166 BC can help you. Call the Standard Oil office nearest you anywhere in 15 Midwest and Rocky Mountain states. Or write to Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

*Quick facts about*
**STANICUT OIL 166 BC**

| | |
|---|---|
| 1 | A dual-purpose oil — suitable for both cutting and lubrication. |
| 2 | Non-corrosive to work or machines. |
| 3 | Formulated with E.P. additives. |
| 4 | Stable under all normal conditions. |
| 5 | Non-irritating. |
| 6 | A cutting oil that permits high operating speeds. |
| 7 | Non-staining to either copper or brass. |

STANDARD

**STANDARD OIL COMPANY**
(Indiana)

MINNEAPOLIS-HONEYWELL

# SAVED $2,350 ANNUALLY

on one part alone when they

## SWITCHED TO ALCOA ALUMINUM* SCREW MACHINE STOCK

Mr. Len Mayeron, Chief of Components and Materials Section for Minneapolis-Honeywell, says, "This hub used to be made of cold-finished, free-cutting steel. It was switched to 2011-T3 Alcoa Aluminum Screw Machine Stock and now saves $2,350 annually. Even though steel costs less than aluminum, in this particular situation, savings in machining and scrap salvage more than offset the initial material cost."

If you machine parts from steel or brass, now is the time to take a hard look at these economic facts about aluminum:

1. Aluminum costs less than brass, and machines just as fast.
2. Aluminum machines faster than steel and won't rust.
3. Aluminum scrap allowance is high.

Now is the time to switch to Alcoa® Aluminum. To help you make that switch, call on your nearest Alcoa sales office. For immediate delivery of Screw Machine Stock, contact your nearest distributor. ALUMINUM COMPANY OF AMERICA, 868-J Alcoa Building, Pittsburgh 19, Pa.

**HERE IS ACTUAL COST COMPARISON OF $2,350 SAVINGS ON THIS PART**

*Steel Cost* per 1,000 parts:

| | |
|---|---|
| 78.5 lbs @ 11¢ per lb | $ 8.63 |
| Less 64% scrap @ 1.1¢ per lb | .55 |
| Net cost | $ 8.08 per 1,000 |

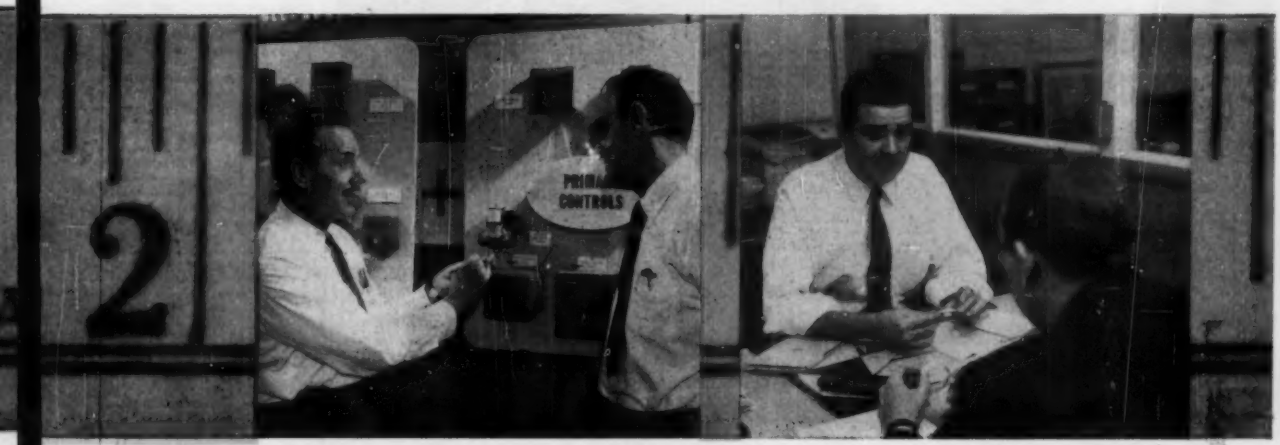
*Aluminum Cost* per 1,000 parts:

| | |
|---|---|
| 27 lbs @ 65¢ per lb | $17.55 |
| Less 64% scrap @ 14¢ per lb | 2.42 |
| Net cost | $15.13 per 1,000 |

Steel machine time 7.86 hours per 1,000 parts.
Aluminum machine time 2.60 hours per 1,000 parts.

| | |
|---|---|
| Labor savings 5.26 hours @ 2.265¢ | $11.91 |
| Less difference in material | 7.05 |
| Net savings per 1,000 parts | $ 4.86 |

Annual savings on this single-part total $2,350



IN ENGINEERING, Len Mayeron (Right), Chief of Components and Materials Section, discusses cost reduction with John Kriechbaum, Chief of Design and Development Department. Mr. Mayeron says, "We like Alcoa's technical literature and the way they pitch in and help us with production problems."

IN PURCHASING, Bill Smisek, Assistant Purchasing Agent, says, "Alcoa always meets metallurgical specifications. I seldom have had to reject their material. In emergencies, Alcoa seems to be able to find us extra quantities and give us faster than normal deliveries."

**✻LEARN WHY OTHER COMPANIES HAVE SWITCHED TO ALCOA ALUMINUM**

Your Guide to the Best In Aluminum Value

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ALUMINUM COMPANY OF AMERICA

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Senior Associate Editor, *American Machinist*
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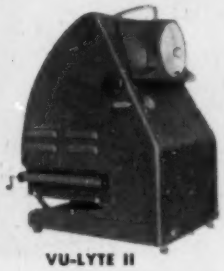
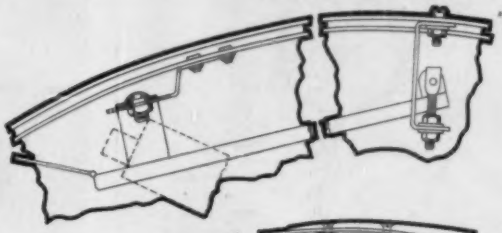
# Waldes Truarc Rings cut assembly costs, improve performance of precision photo-optics equipment

**Charles Beseler Co., E. Orange, N. J. uses Waldes Truarc Retaining Rings in 3 applications shown.**

**REFLECTING MIRROR ASSEMBLY IN OPAQUE PROJECTOR**



VU-LYTE II PROJECTOR



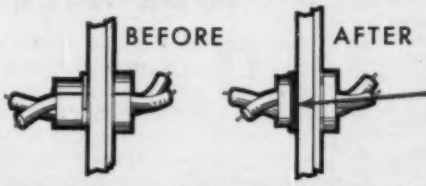
**BEFORE**

"The front surface mirror is the most precise optical element in a properly-functioning opaque projector," Beseler writes. "Previously we used this extremely cumbersome means of holding the mirror in position. As mirror adjustments are always required and the mirror is extremely delicate, our spoilage was terrific."

**AFTER**

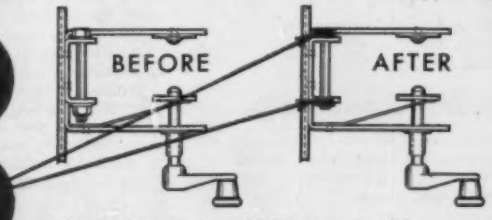
"Two Truarc Series 5100 Rings made possible complete redesign of the mirror assembly. Now mirrors can be adjusted from *outside* the projector. Rejects now are practically nil. More precise adjustment of the mirror is possible. And because of the greater ease in adjustment, we have cut labor costs $2.00 per unit."

**HEAT ASSEMBLY IN PRINT DRIER**




Here a Waldes Truarc crescent ring, Series 5103, replaced a split collar and clamping ring. Results: labor costs cut 50¢ per unit because of greater ease of assembly. Drier provides more uniform heating.

**35 MM MICRO-FILM NEGATIVE CARRIER IN ENLARGER**




2 Waldes Truarc Series 5133 E-Rings replaced 2 cap nuts—at a saving of 20¢ per unit in labor costs.

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AM 9/9

WALDES TRUARC Retaining Rings, Grooving Tools, Pliers, Applicators and Dispensers are protected by one or more of the following U.S. Patents: 2,382,948; 2,411,426; 2,411,761; 2,416,852; 2,420,921; 2,428,341; 2,439,785; 2,441,846; 2,455,165; 2,483,379; 2,483,380; 2,483,383; 2,487,802; 2,487,803; 2,491,306; 2,491,310; 2,509,081; 2,544,631; 2,546,616; 2,547,263; 2,558,704; 2,574,034; 2,577,319; 2,595,787, and other U.S. Patents pending. Equal patent protection established in foreign countries.

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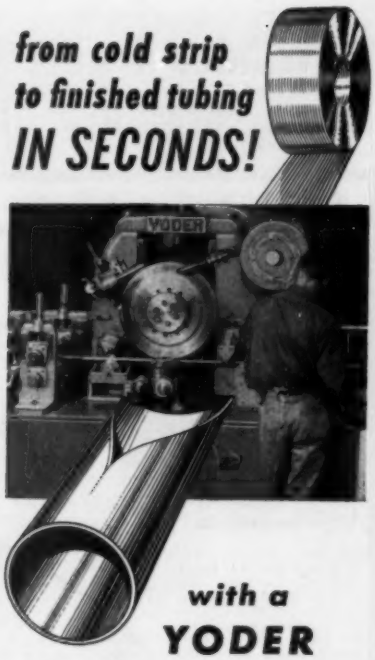


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- Power Table Lift
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**From the *American Machinist* Library of *Tips for Top Shop Men***

THERE'S an old saying that "If you want to be big, you've got to look big." Nobody likes a fourflusher or a fop, but everybody has been trained from childhood to expect a leader to look like one. Company policy can't earn respect on the major things either, if it is small on the minor things. Don't make your company look small.

ROCKWELL-BUILT

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Delta 17" Drill Press
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## ...improve production and cut costs

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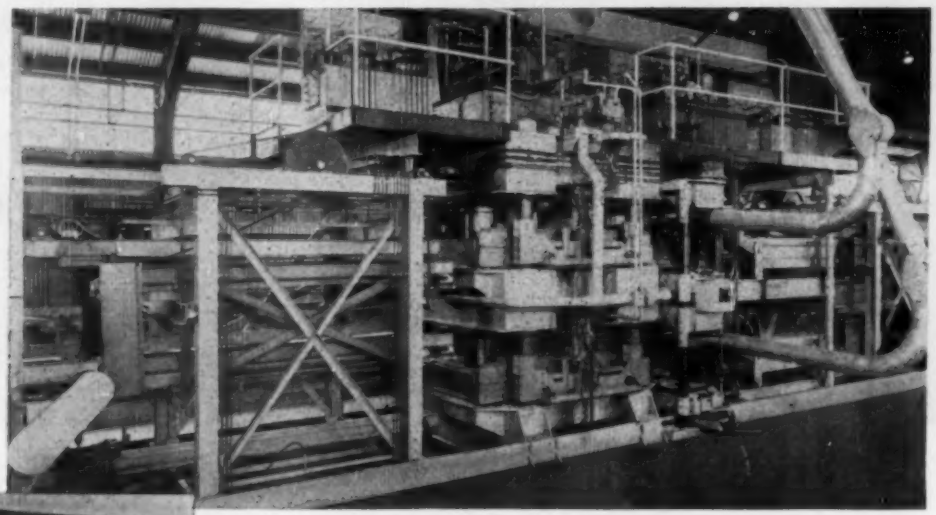
## *IN HARDBOARD PRODUCTION*

## With VICKERS® HYDRAULICS

*METALWORKING is not alone in using Vickers Hydraulics for Automation*

**REDUCES COSTS • IMPROVES UNIFORMITY • PROVIDES FLEXIBILITY**

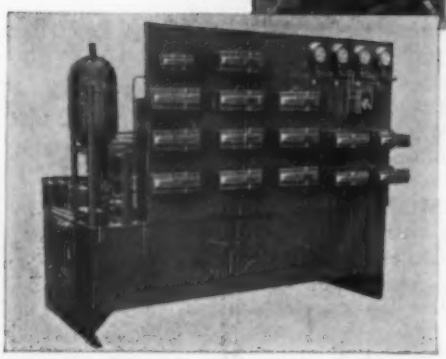


**Prepress area of automatic hardboard plant designed and built as a package unit by the Industrial Development Company, Tacoma, Washington for Columbia Hardboard Company, Inc.**

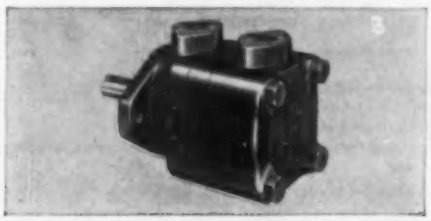
Reported to be the most highly automated in the wood products industry, this plant produces 60,000 sq ft of "Cedawood" per day (½" basis).

Seven Vickers Custom-Built Hydraulic Power Units play an important part in this performance; four are shown (in the photograph above) mounted on the platform directly above the prepress. The other three operate a series of automatic transfer systems in various parts of the plant. The transfer drives also use Vickers Vane Type Hydraulic Motors, which provide easily controlled variable speed for synchronizing various operations and for overload protection.

The use of hydraulic variable speed drives makes it easy to vary production rate, flakeboard thickness (⅛" to 1"), and type of product. Additional features are: accurate control, simplicity of installation, and low maintenance. For further information about the many benefits you get from Vickers Hydraulics, ask for Bulletin 55-67.



This Vickers Custom-Built Power Unit is individually designed to meet specific needs. It assures dependable performance, improves and simplifies design, reduces installation time and cost, and makes servicing easier. Write for Bulletin 52-45.



The performance-proven Vickers Balanced Vane Type Hydraulic Motor is an economical, efficient, and compact means of providing variable speed rotary power. It can be used for reversing service and can be stalled under load without damage. Write for Bulletin I&M-5103.

7834

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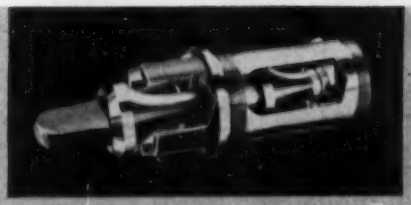
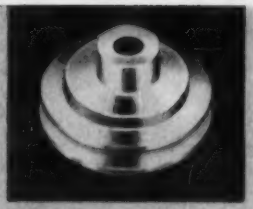


10% faster
*Carpenter No. 5*

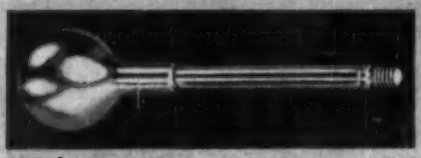


Rejects down 25%
*Carpenter No. 5*

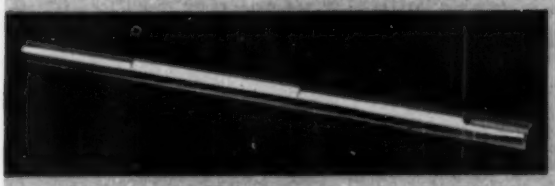
Production up 25%
*Carpenter No. 5*

18% more production
*Carpenter No. 8*

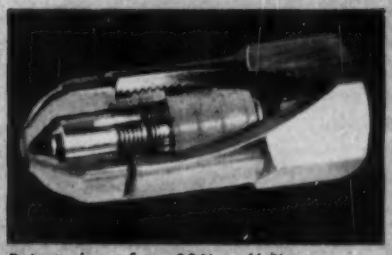
5 to 10% faster
*Carpenter No. 8*



10% fewer rejects
*Carpenter No. 8*



Machining cost cut 50%
*Carpenter No. 8*



Rejects down from 10% to ½%
*Carpenter No. 5-F*

# More profitable production... the No. 1 benefit of *Carpenter* stainless

Free-Machining Stainless Steels by Carpenter start to prove their superiority right from the first production records. Seven of the eight examples in the illustration had a chance to use other steels first, then switched to Carpenter. The other used Carpenter first, then substituted another steel during emergency. He was quick to return to Carpenter.

Availability? Never Better! You can depend on rush delivery of Stainless No. 5 and No. 8 from your Carpenter Mill-Branch Warehouse, Office or Distributor. Build more profit into your production with Carpenter Free-Machining Stainless Steels.

*Carpenter* STEEL

**Free-Machining Stainless Steels**

The Carpenter Steel Company, 109 W. Bern St., Reading, Pa.
*Export Dept.: The Carpenter Steel Co., Port Washington, N. Y.—"CARSTEELCO"*

View of machines at Caterpillar Tractor Co., Peoria, equipped with Seibert Precision-Built Spindles, Adapters, and Holding Tools.

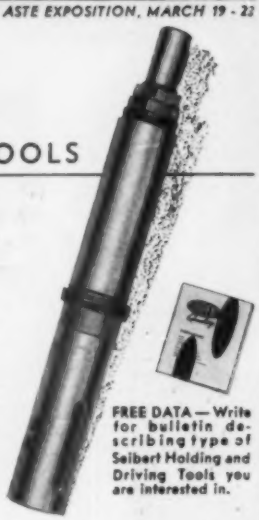
SEE US AT BOOTH 1500, ASTE EXPOSITION, MARCH 19 - 22

# 12 Year User

OF

SEIBERT PRODUCTION TOOLS

• Like any other reputable manufacturer, large or small, we are especially pleased when the products of our labor are accepted for tests and eventually approved for actual service by a manufacturer or machine tool builder. Yet, being realistic, we know full well this is only the beginning. The acid test comes later, proving our ability to maintain high standards of quality and a constant, dependable service day-in and day-out over a period of years. It is therefore, a source of deep gratitude and satisfaction in that we have, over a period of years, been privileged to serve so many fine companies like Caterpillar Tractor Co. who serve others so well.



FREE DATA—Write for bulletin describing type of Seibert Holding and Driving Tools you are interested in.

SEIBERT

**SEIBERT & SONS, INC.** 1004 E. 24th STREET CHENOA, ILLINOIS

*Quality* MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS



# Just Imagine This...

You prepare an operation sheet to manufacture a complicated part. Instead of giving that sheet to a group of operators to make the part, you place the sheet into a controller, or a director, and push a button. The controller sets a machine tool in motion, and interprets the operation sheet's instructions to machine the part completely *without human help.*

Impossible? Farfetched? Not quite! It's already been done, and successfully, with Numerical Control. And the maintenance problem is negligible. At M.I.T., for example, a prototype milling machine "director" operated for 8,000 hours with only 3% down-time.

Twenty-four pages of step-by-step facts and pictures on how Numerical Control has been proved practical by extensive study and use are available to you in our special report, "Numerical Control — What It Means to Metalworking." The report tells you what Numerical Control is . . . why it will be used more . . . how numbers control . . . what computers contribute . . . and the 13 plus advantages of using this system. You'll especially want to read the pages that explain why firms *both large and small* will be able to afford Numerical Control.

To get the inside story of today's machine-tool control for tomorrow, write for your copy of this report now. 35¢ each.

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**American Machinist**

McGRAW-HILL BUILDING

NEW YORK 36, N. Y.


## From the *American Machinist* Library of *Tips for Top Shop Men*

PROCEDURE for methods improvement: Pick an operation to be improved. Put down in writing what happens—the details. Challenge each detail in order. Where a chance for improvement appears, develop the better method. Apply it on the job.

CAPEWELL

# hole sawing case history

**CAPEWELL PRODUCTS**

Carbon and High Speed Steel Band Saws, Hand and Power Hack Saws, Hole Saws, Pipe Fitters' Hand Tools, Hammers, Ground Flat Tool Steel, Foundry Chill Nails.

**THE USER:** The C. I. Thornburg Co., Inc., Huntington, W. Va.

**THE JOB:** Cutting 70,000 2" holes

**THE MATERIAL:** National Tube Division 16" seamless steel pipe—¼" wall

**THE PROBLEM:** Too few cuts per saw, and excessive breakage

**THE SET-UP:** Four 17" Delta drill presses with Bellows DFE-2-360 press feeds—speed, 125 r.p.m. at 365 lbs. feed pressure. Pure Oil Co. Purosol No. 10 coolant. (Speed and feed recommended by Capewell Engineering Department.)

**THE ANSWER:** Safetech Shatterproof High Speed Welded-Edge Hole Saws.

**THE RESULTS:** Up to 2138 holes per saw, with production far ahead of schedule.

After the Thornburg Company standardized on Safetech Hole Saws, production was increased to such a point that operations had to be suspended to meet customers' delivery requirements. This case history is not unusual—and you, too, can expect similar excellent results when Capewell Safetech Hole Saws do your cutting.

*Shatterproof, High Speed, Welded-Edge Safetech* means faster cutting, more cuts per blade, and complete operator safety. Try one—see for yourself, and you'll always specify Safetech.

***SOLD ONLY THROUGH CAPEWELL DISTRIBUTORS***
who provide complete inventory, engineering assistance, delivery when you need it.

**THE CAPEWELL MANUFACTURING COMPANY**
**Hartford 2, Connecticut**
Yes, please send me details on Safetech High Speed Welded-Edge Hole Saws.

**Name**_____

**Company**_____

**Address**_____

**City**_____ **State**_____

7CA37A

## *TWO GREAT BEARING DEVELOPMENTS ROLLED INTO ONE!*

# PLYA-SEAL WIDE INNER RING BALL BEARING

*Designed expressly for slow speed applications and wet or dirty operating conditions*

New Fafnir Plya-Seal Wide Inner Ring Ball Bearings are a combination of two outstanding bearing developments. The most effective seal ever devised for retention of grease and protection against contamination, plus the famous Fafnir self-locking collar, for cost-cutting, twist-of-the-wrist bearing installation. This combination of features offers you several advantages . . .

**Best protection yet** against dirt, dust, steam, water, lint, other contaminants on slow to moderate speed applications. Contact-type, Plya-Seals seal out abrasive or corrosive material, seal in factory prepacked lubricant.

**Less Maintenance** — In many applications, non-relubricatable bearings may be used. They require virtually no maintenance time or expense. In other applications, where bearings receive hard or constant use, relubricatable types are available. They require only occasional greasing, even under severe conditions.

**Longer Service life** — Plya-Seals protect against premature bearing wear or failure. Contaminants cannot damage balls or races; sealed-in lubricant ensures against bearing "running dry".

**Simplified Designing** — Bearing housings may be designed without incorporating separate housing seals. Plya-Seals provide full protection; make possible simplified, less costly, more compact housings.

**FAFNIR**
**BALL BEARINGS**
MOST COMPLETE LINE IN AMERICA

*Power Transmission Units incorporating new Fafnir Plya-Seal Wide Inner Ring Bearing*

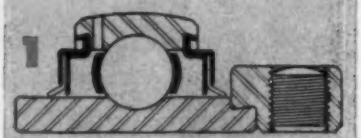
RAK and RAS Type Pillow Blocks

RCJ Type Flange Cartridges

Fafnir Flangettes

Write for bulletin containing complete specifications on Fafnir Plya-Seal Wide Inner Ring Ball Bearings and Power Transmission Units. The Fafnir Bearing Company, New Britain, Conn.

1



**PLYA-SEALS**

As incorporated in the Fafnir Plya-Seal Wide Inner Ring Ball Bearing, the Fafnir Plya-Seal consists of a synthetic rubber-impregnated fabric sealing washer sandwiched between dished steel plates. Seal flares out, maintaining constant contact with ground outside diameter of inner ring. Years of service have proven Plya-Seals the most effective seal ever developed for ball bearings.

2

**SELF-LOCKING COLLAR**

Originated by Fafnir, this famous development has cut costs and simplified assembly throughout industry. Bearings slip onto shaft; are locked securely with simple twist of self-locking collar. No need for lock nuts, shoulders, sleeves, washers, or adapters. Positive binding action increases with use.

# Which Type ADJUSTABLE SPEED DRIVE CONTROL Do You Need? SQUARE D BUILDS BOTH!

Typical application of Adjustable Voltage Drive to large metal spinning lathe in operation at Phoenix Products Company, Milwaukee

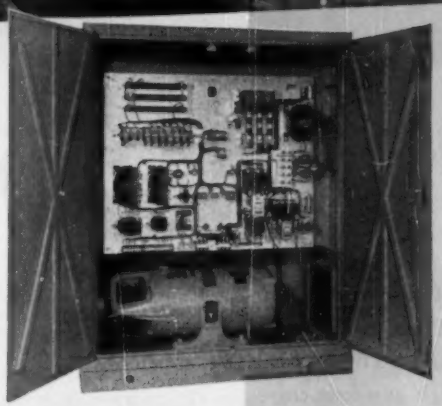
## ADJUSTABLE VOLTAGE CONTROL FOR M-G SETS...Through 400 HP

**Simplified Circuits** with rugged heavy-duty control components.

**Easy Maintenance** because standard magnetic starters, relays and timers are used in combination with static regulators.

**3 Types Available** • (*1*) magnetic amplifier exciters (*2*) dry disc exciters (*3*) rotating exciters.

**Easy to Adjust** because centralized "tune-up" elements are accessible and readily identified.



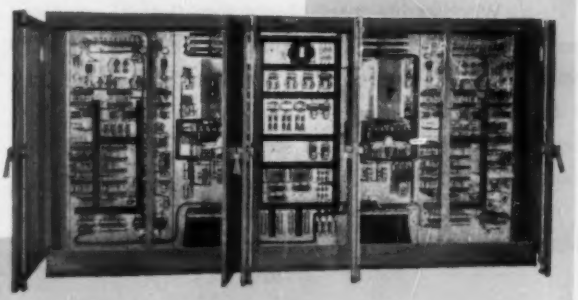
## FULLY ELECTRONIC with SIMPLIFIED FAIL-SAFE CIRCUITS THROUGHOUT

**Simplified Circuits** use less tubes. Fail-safe circuits prevent motor runaways.

**Easy Maintenance** because sub-panels can be quickly removed and replaced. "Brain" panel senses varying conditions.

**Easy to Adjust** with only a few, very accessible potentiometers.

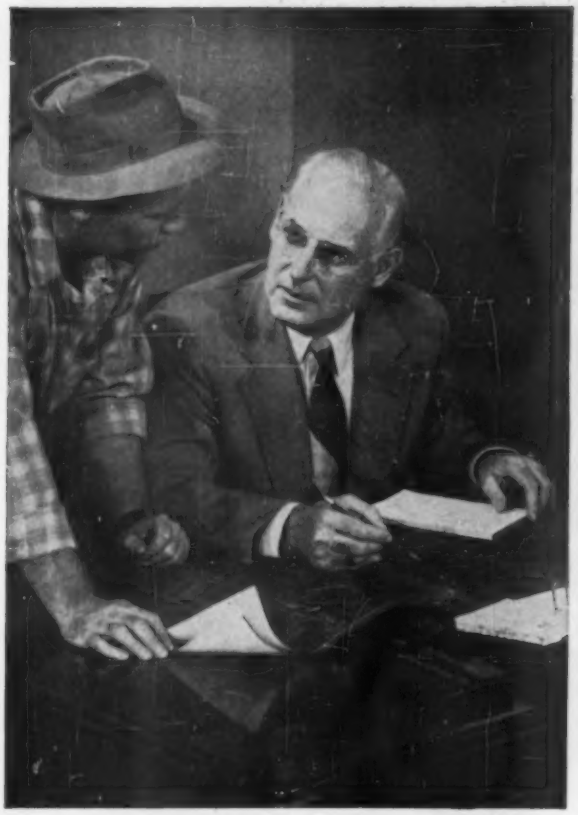
Both types are available in two kinds of construction—standard package and custom-built.



*Write for descriptive literature. Address Square D Company, 4041 North Richards St., Milwaukee 12, Wis.*

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY



# rush it to CDT

Get those tough special design jobs off to Columbus Die-Tool for quick action. An outstanding engineering staff backed by 50 years of Company experience can make tough jobs look easy.

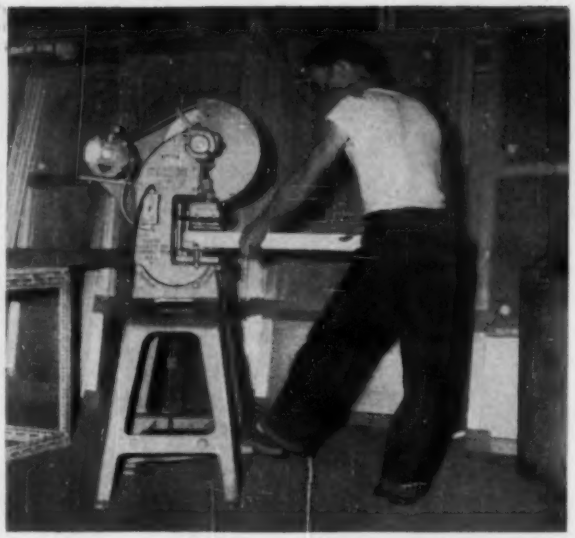
Whether it's special tools, jigs, fixtures or even special machinery, you'll find that CDT can build them better, faster and more economically. That's why so many of the nation's leading manufacturers regularly avail themselves of the specialized services of Columbus Die-Tool.

Perhaps we can solve your tooling problem and help you make your product . . . better, for less.

**Columbus Die-Tool**
**AND MACHINE COMPANY**

P. O. BOX 750 • COLUMBUS, OHIO
ESTABLISHED 1906

*Designers and manufacturers of* JIGS • FIXTURES • SPECIAL TOOLS • UNITS FOR MACHINE TOOLS • *also Builders of Machine Tools Complete*



# "famco POWER PRESSES give us trouble free operation . . . no down time."

D. A. CHALMERS, *President*
*Chalmers Inc., Melrose Park, Ill.*

Not one red cent spent for parts in two years . . . no downtime! And, they did it with Famco Power Presses.

That's the enviable record chalked up by Famco on-the-job at Chalmers Inc., manufacturer of anodized aluminum AIR SEAL windows and doors.

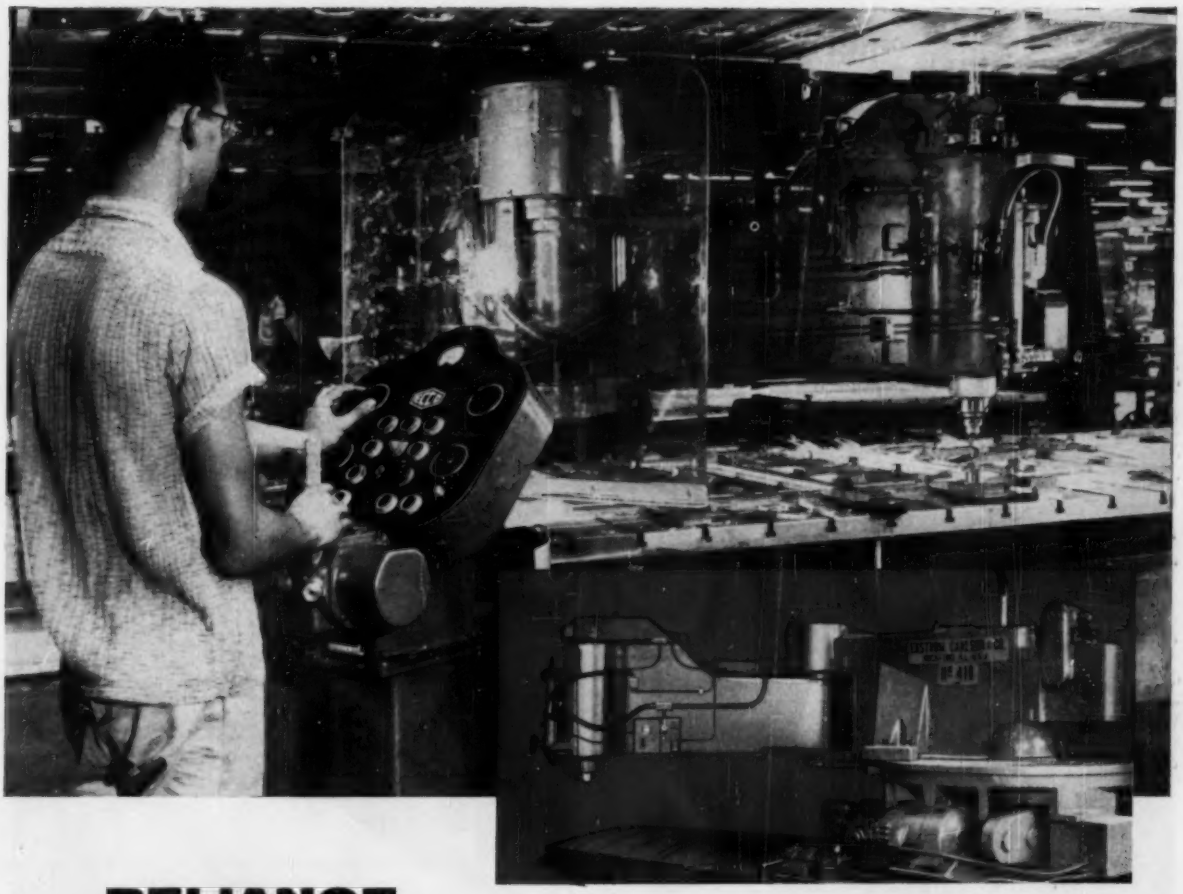
Notching Z bars, punching side rails and crimping inserts are but a few operations these presses handle efficiently, day-in and day-out at Chalmers.

Maybe you'd like lower operating costs, trouble free power press performance. If so, it will pay you to investigate the Famco Power Press line. Famco has over 50 different models to select from —bench or floor, standard or deep throat—in 4 to 18 ton capacity. And, *only* Famco offers 4 great clutch types for its presses.

Learn how Famco Power Presses can save you production time and money now!

*Write for* **FREE Famco Power Press** *catalog today.*

**famco machine company**
3136 SHERIDAN ROAD • KENOSHA 9, WISCONSIN
AIR PRESSES • ARBOR PRESSES • BAND SAWS • DRILL PRESSES • FOOT PRESSES • POWER PRESSES • SQUARING SHEARS • MILLING MACHINES



# RELIANCE DRIVES NEW MILLING MACHINE

This unique milling machine designed for milling big aircraft parts operates exactly like a huge arm. Its cutter swoops in and out at the touch of the joy stick control. The direction in which the stick is pushed is the direction of the head movement. The harder the push the faster the movement.

This unusual feed drive is made possible by a Reliance V★S Drive. Two 7½ hp. Variable Speed D-c. Motors, one each at shoulder and elbow, provide the flexible arm-like feed movements. The motors are controlled and directed by the joy stick.

The result is an extremely compact and versatile feed drive that gives eye-popping performance. Economical in original cost, these Reliance Drives will provide years of steady service with little maintenance.

If you are designing, building or buying machine tools, it will pay you to check the economies of Reliance Variable Speed Drives. A-1516

*Write for Bulletin D-2311*

RELIANCE V★S DRIVE®

**RELIANCE ELECTRIC AND ENGINEERING CO.**

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# Greatest thing that's happened since the Madison Boring Tool!

## *Madison-Faessler Roller-Burnishing Tool*

- ***Superior Surface Finish*** — five micro-inches or better.
- ***Single Pass Operation*** — for roller-finishing bores of any length.
- ***Fast, Easy to Set Up*** — on conventional shop machines.
- ***Adjustable in Size*** — for easy-to-handle job changes.
- ***Off-the-Shelf Delivery*** — of standard tools in most popular sizes.
- ***Extra Long Life*** — thousands of passes before parts replacement.

No wonder a customer said it's "the greatest thing since the Madison Boring Tool!" If you'd like to know more about this fabulous tool, or our roller-burnishing tools for O.D. cylindrical surfaces as well as tapers and radii, just send coupon today. Attn: Dept. AM-3

**Let the man with the holes in his head tell you how to cut costs in:**

- ★ **Boring**
- ★ **Reaming**
- ★ **Deep Hole Drilling**
- ★ **Trepanning**
- ★ **Roller-Burnishing**
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Dept. AM-3

☐ Please send me bulletin on the Madison-Faessler Roller-Burnishing Tool.

☐ Have representative call.

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*Inner Diameters Are Our Business*

# MADISON-FAESSLER

**TOOL COMPANY** *MOBERLY, MISSOURI*

ASSOCIATED WITH MADISON INDUSTRIES, INC.

# MICRO SWITCH . . . FIRST IN PRECISION SWITCHING

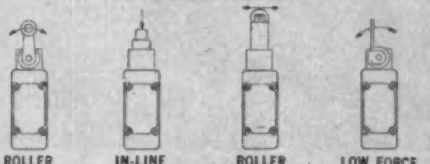
## These low-cost MICRO SWITCH controls increase production speed and efficiency—reduce breakage, waste and injury

**TYPE LS SERIES**—Rugged, small, reliable. Moving parts and switching chamber completely sealed. Two-circuit, double break contact arrangement. Operating force—3 lbs. max. No. 8 terminal screws accommodate No. 14 stranded wire.

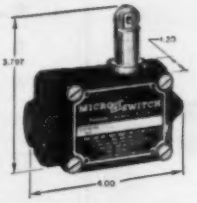
ACTUATOR DESIGN

**TYPE ML SERIES**—Heavy duty limit switches. Combine rugged, sealed construction, precise operation and extremely versatile adjustability. Available in high-capacity, explosion-proof and two-circuit versions.

ACTUATOR DESIGN

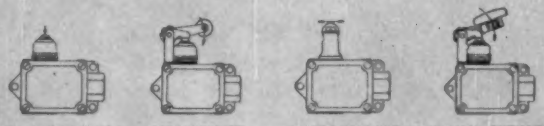



*Thousands of plant operating men are using these versatile switches to upgrade present plant equipment*

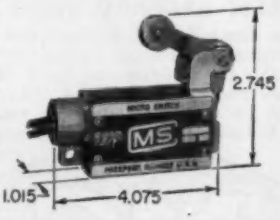


**TYPE F SERIES**—Rugged, compact precision switches with high current capacity. Seals make enclosure dust and oil-tight. Accurate repeatability. Available in either left hand or right hand designs. The SPDT series will make and break steady state currents of 20 amps. 125, 250 or 460 vac and handle in-rush currents as high as 75 amps.

ACTUATOR DESIGNS

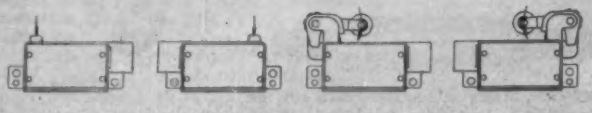


For complete information Send for Catalog 83




**TYPE LN SERIES**—High strength cast enclosure and design of plunger mechanism permit rapid, hammer-blow cam actuation without harm to enclosed basic switch. Extremely compact design often permits use in applications where no other switch will fit.

ACTUATOR DESIGNS



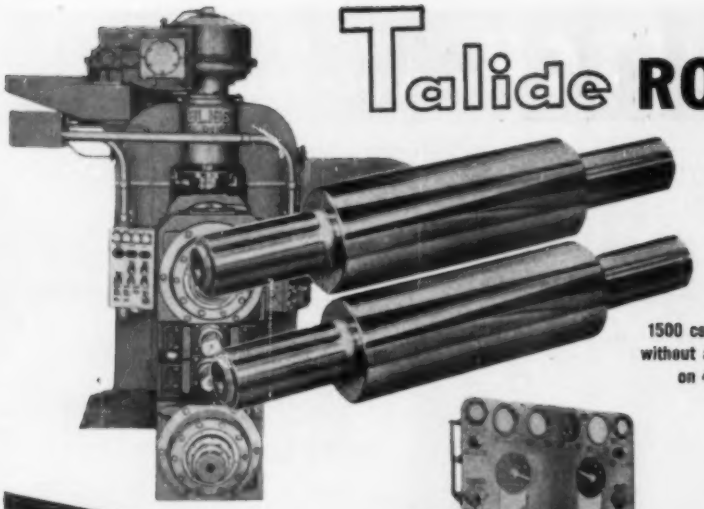

*MICRO SWITCH precision switches for plant equipment are available in hundreds of variations of actuator designs, circuitry, electrical capacity and terminal designs. See your nearby Authorized Distributor. Look under "Switches, Electric" in the Yellow Pages.*

**MICRO SWITCH**

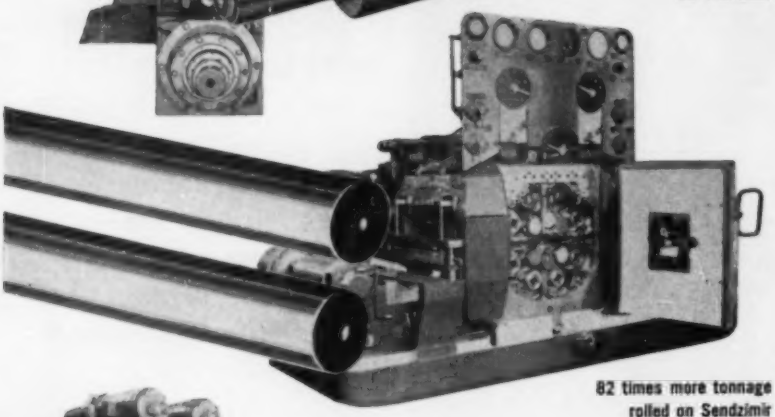
A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

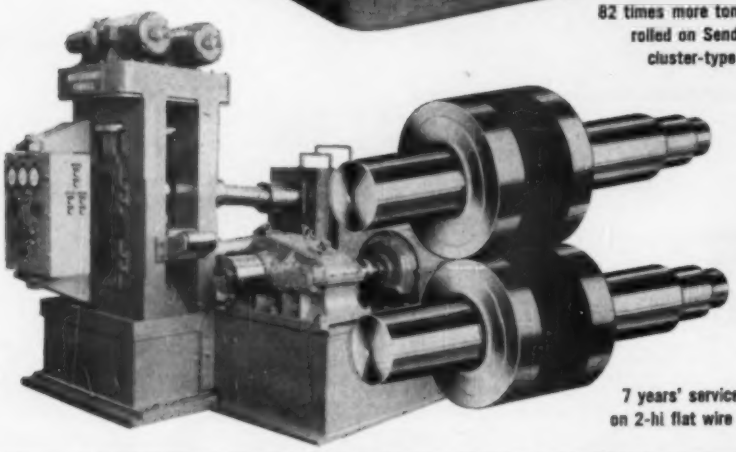
# Talide ROLLS OUTLAST ALL OTHERS!



1500 coils rolled without a regrind on 4-hi mill.



82 times more tonnage rolled on Sendzimir cluster-type mill.



7 years' service life on 2-hi flat wire mill.

Talide rolls have proven far superior to both steel rolls and carbide rolls of any other make.

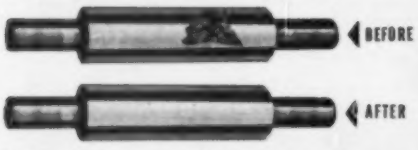
During the last five years Talide rolls have been adopted by every major strip steel producer. Metal Carbides pioneered and developed tungsten carbide rolls and successfully adapted them to all types of rolling mills including STECKEL, BLISS, UNITED, MESTA, STANAT, SENDZIMIR, WATERBURY-FARREL, TORRINGTON, RUESCH, FENN, WEAN, COLD METAL, etc.

Talide work rolls are ultra-hard, extremely dense and porous-free. Manufactured from highest purity tungsten carbide powders, the surface finish of a Talide roll is smoother than one micro-inch. Hard as a diamond, it will take a "bigger bite" than a steel roll. Strip steel of all analyses can be rolled down to thinner gauge, with more accuracy, greater reductions and with fewer anneals than possible with any other roll.

## ONLY TALIDE WORK ROLLS GUARANTEE THESE ADVANTAGES

- ★ MORE PRODUCTION
- ★ BETTER FINISH
- ★ LONGER LIFE
- ★ HIGHER SPEEDS
- ★ CLOSER TOLERANCE
- ★ IMPROVED PHYSICALS
- ★ GREATER REDUCTION
- ★ LESS DOWN TIME
- ★ FEWER REJECTS
- ★ LESS MAINTENANCE

## EXCLUSIVE REPAIR SERVICE



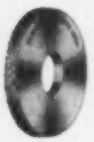

Broken or damaged carbide rolls can be re-worked to first class condition with all defects eliminated at one-half original cost. Only Metal Carbides offers this service—because of its exclusive hot press method.

**Talide Rolls are made in lengths up to 100", diameters up to 25", and up to 5000 lbs. by weight.**

Metal Carbides Corporation,
Youngstown 12, Ohio.

**Send for new 76-page catalog 56-G**

## SUPERSET GRINDING WHEEL



The Superset diamond grinding wheel was specially developed for grinding carbide rolls to highest possible surface finish and luster. Made of 4-8 micron size diamond dust, it imparts a surface finish far superior to any other commercial wheel. Available in sizes up to 25" diameter

METAL CARBIDES CORPORATION
TALIDE®
YOUNGSTOWN 12, OHIO
HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

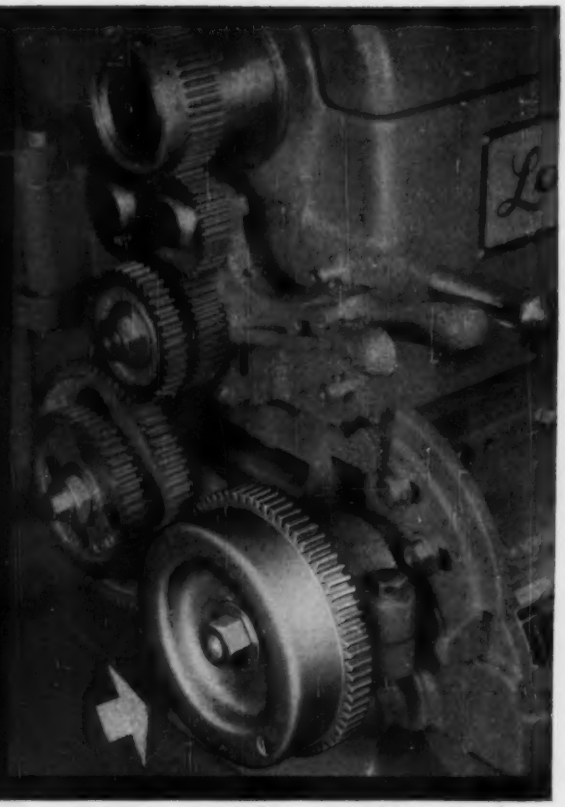
Advanced Design at Work

## *Automatic Safety Gear*

guards *Logan* Lathes

against gear train

overload damage



**12" Swing No. 2525-V**
**Logan Screw Cutting Lathe**

The Automatic Safety Gear neutralizes sudden overload shocks, automatically disengaging if the carriage or tool jams up, and thereby reduces breakage to all gears from the spindle through the quick change gear box and into the carriage. It is furnished as standard equipment with all Logan 12" and 14" lathes and may be ordered installed on new Logan 9", 10" and 11" lathes. The Automatic Safety Gear can be furnished for any quick change gear Logan Lathe already in your shop at a price of $10.00 for 9", 10", or 11" lathes and $15.00 for 12" or 14" lathes.

This protective feature typifies the advancement of design and thoroughness of construction that make these Logan Lathes efficient tools for high speed production and second operations. The ball bearing spindle combined with variable speed drive provides sustained accuracy and the exact rpm best for the work. The precision carriage rides a 2-V-way, 2-flat-way bed that is precision ground and furnished flame hardened at small extra cost. See your Logan dealer for full details, or write for the Logan catalog.

**Brief Logan Lathe Specifications**
SWING, 14⅜" down to 9"... CENTERS, 40" to 17"... COLLETS, 1" to ½"... SPINDLE BORE, 1⅛" to 25/32"

**Advanced Design Features**
Ball Bearing Headstock... Variable Speed Drive on larger models... Double V-Belt Drive on smaller models... Automatic Safety Gear... Precision Carriage... 2-V-way, 2-flat-way precision ground bed, furnished flame hardened at small additional cost.

**LOGAN ENGINEERING CO.**

4901 WEST LAWRENCE AVENUE, CHICAGO 30, ILLINOIS

Building Machines?
use
CIRCLE R
know-how!
Capacity 51,840 Blanks per hour
Any machine you build or use can deliver full capacity only if metal-cutting components are fully reliable. We regularly advise on cutting tools that enable good machines to deliver their best. Consult your Circle R representative!
Burbank Chicago Cleveland Dayton Detroit
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Pittsburgh Providence Rochester St. Louis Westbury, L. I.
SEND FOR CATALOG O
CIRCULAR TOOL CO., INC.
PROVIDENCE 5, RHODE ISLAND
Specialists in Circular Cutting Tools Since 1923

**From the *American Machinist* Library of *Tips for Top Shop Men***

BE sure your machine tools don't spend most of their "working" day as layout tables. A machine tool earns its keep only when it is cutting metal. Jobs can be set up on a surface plate or bench by someone else—frequently someone better at setup than the machine operator.

# SAVE VALUABLE ALUMINUM!

Cutbacks of aluminum for civilian consumption, and its importance in defense production, increase the necessity of economical and efficient methods for working this widely used non-ferrous metal. The *American Machinist* Special Report, "How to Work Aluminum and its Alloys," explains what you can do to make your supply of aluminum go further.

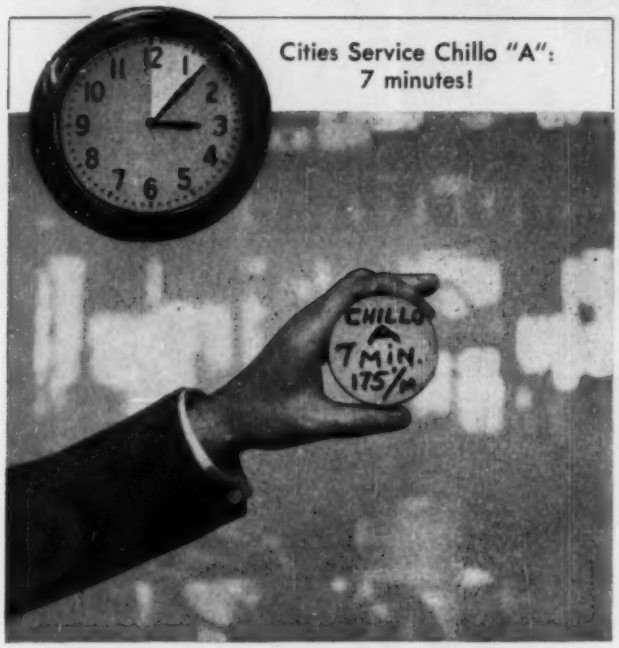
This valuable 16-page article is a summary of the latest developments in fabricating this vital metal . . . the characteristics of aluminum alloys . . . machining methods . . . sheet-working methods . . . casting and forging . . . joining methods . . . cleaning and finishing. Reprints of this timely article are available at only 25 cents per copy.

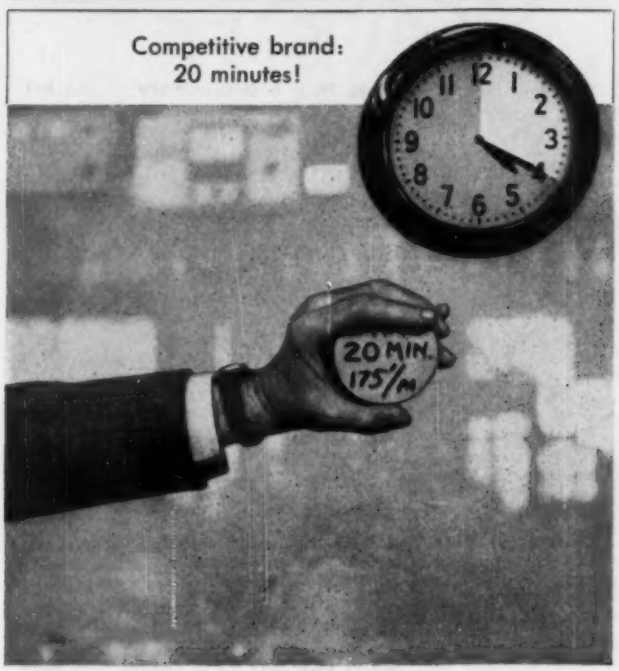
*Write Reader Service Department:*

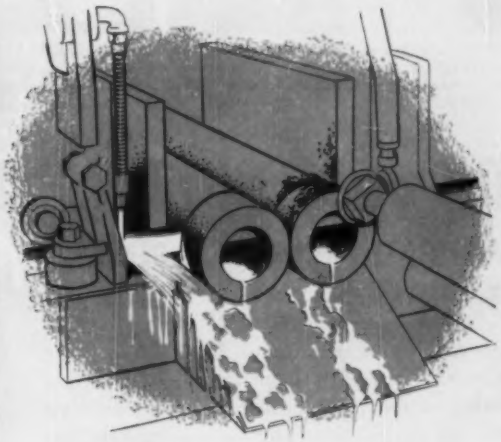
**American Machinist**
**McGraw-Hill Building**
**New York 36, N. Y.**

# Cutting Oil takes the time test

## at S. G. Frantz Co., Inc., Trenton, N. J.



S. G. Frantz Company decided to keep a truly open mind.

They'd been using Cities Service Chillo Cutting Oil and other Cities Service products for some time with great satisfaction. Still, there was no harm testing Chillo Cutting Oil against another brand just to make sure they were getting maximum results.

But even the people at S. G. Frantz never expected what followed. Using the competitive oil, and a piece of 4130 aircraft rod, 2⅞" in diameter, they made a single cut at saw speed of 175 feet per minute. Time: 20 minutes.

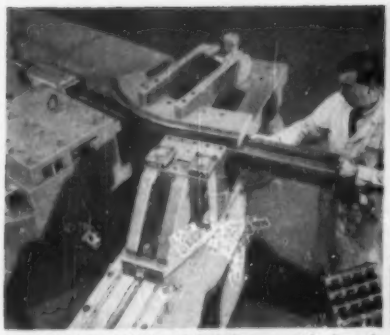
Next, the same test again – but this time with Cities Service Chillo "A" Cutting Oil. Time: 7 minutes! Nearly three times faster!

Using the same material on another job, the Frantz Company found difficulty making clean threads to aircraft standards on a Number 5 Turret Lathe–that is, until Cities Service Chillo 10Z was tried. Right there the problem ended.

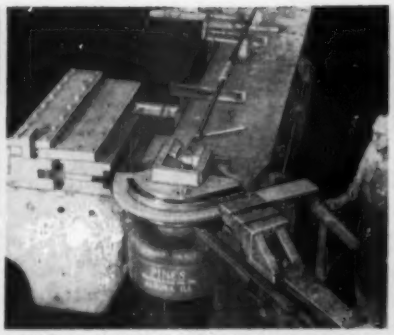
"The problem ended." You'll hear it again and again from those who use Cities Service Cutting Oils and lubricants. And perhaps these oils can end a problem for you, too. Talk with a Cities Service Representative. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

**CITIES SERVICE**

QUALITY PETROLEUM PRODUCTS



HEAVY RECTANGULAR TUBES—accurately formed on Pines Model 4 on a 24" inside radius for air cushion assembly on heavy duty truck chassis. Material is 4" x 5½" x .200" wall.



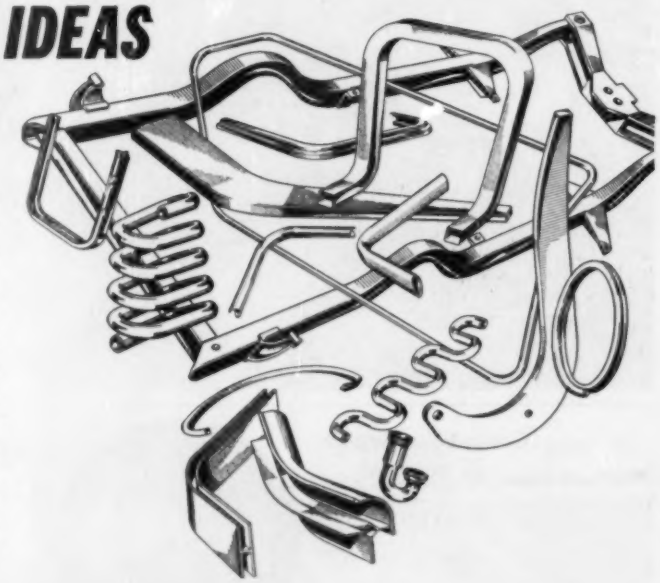
SOLID STEEL BEAMS—cold edge bending of 5½" x 1¼" steel bars on Pines Model 4 replaces hot bending on dozer, produces more accurate parts at lower cost for road machinery manufacturer.

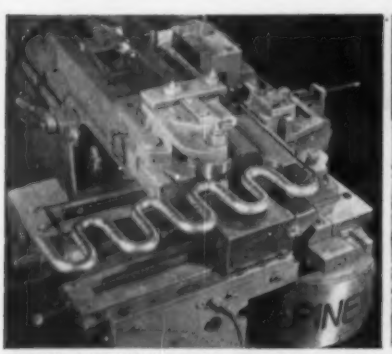
ALUMINUM CHANNELS—rugged machine construction and tooling on Pines Model 3 Machine cold forms 4" x 1¾" x .320" aluminum channel without wrinkling or distorting. Spring-back is controlled by simple machine settings.

# FOR COST CUTTING IDEAS

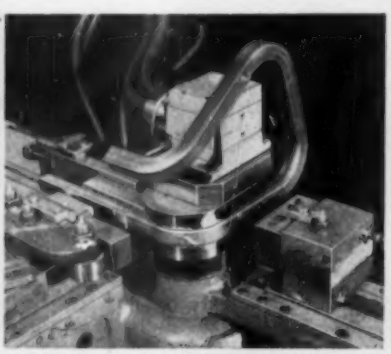
## INVESTIGATE PRODUCTION BENDING THE "PINES-WAY"

When you have a production job requiring the cold forming of parts from round, square, rectangular, extruded, or hollow stock to an even radius; or to different angles, we suggest you investigate the cost cutting advantages of production bending the Pines-way. The examples shown here illustrate a few of the many different and varied applications which are today profitably produced on Pines machines. Cold bending is a fast, accurate, easy to control metal forming process that is today more profitably applied in the production of an ever increasing variety of products. Call on Pines engineers for assistance without obligation on any specific job.

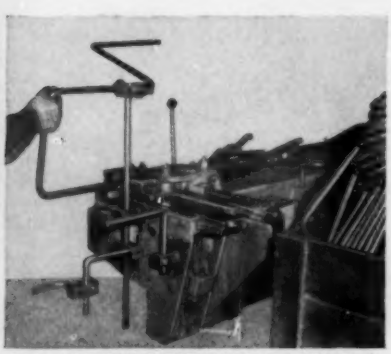




COPPER SERPENTINE BENDS—¾" O.D. x .035" copper tubing is rapidly formed on this Model ¾ into serpentine coils on a 1" ctr. A simple gang-slitting operation produces 180° return bends.



WRINKLE-FREE SQUARE TUBE BENDING—Model 1 Machine, equipped with flexible mandrel and self-opening bending form, produces top quality office and hospital equipment at speeds of 250 bends per hour.



FAST ROUND-TUBE BENDING—Pines Model ¾ Machines speed production of tubular dinette and lawn furniture. Fast, automatic cycling and accurate progressive bending produce 600 to 900 bends per hour.

**PINES ENGINEERING CO., INC.**

Specialists in Tube Fabricating Machinery

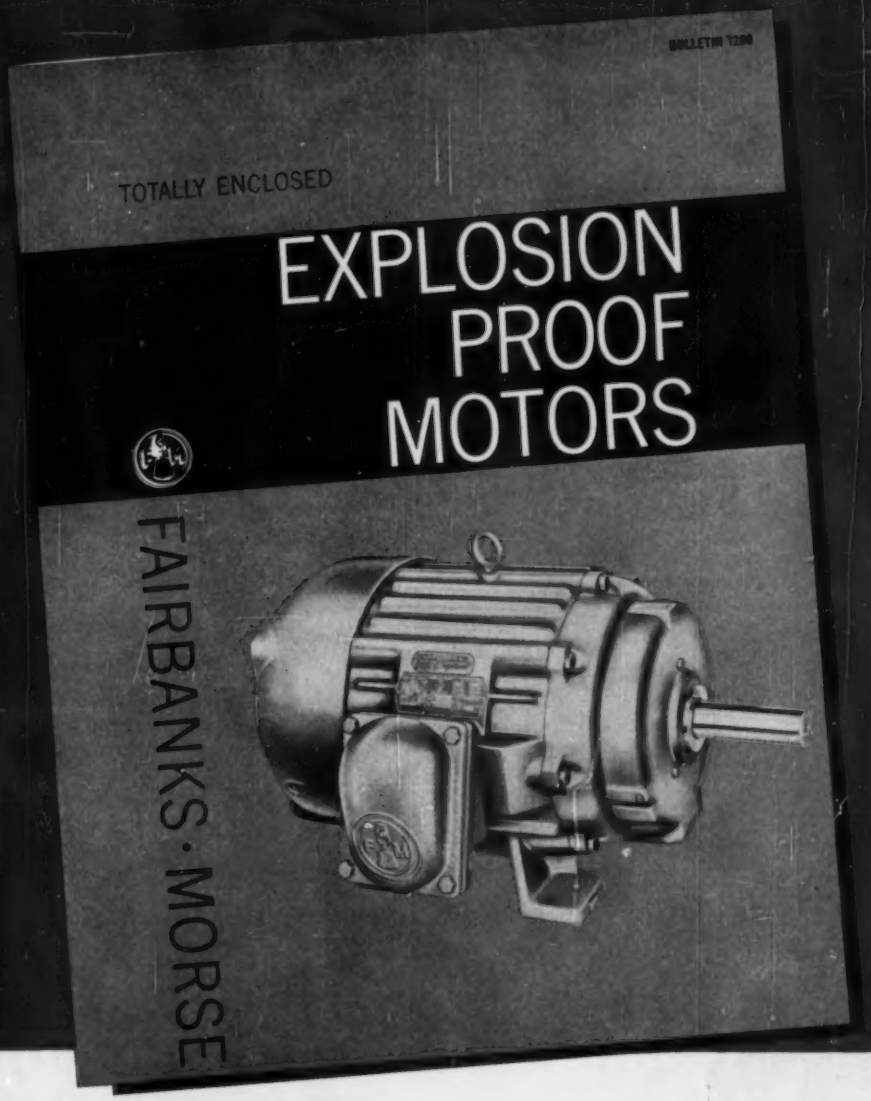
672 WALNUT • AURORA, ILLINOIS

**WRITE FOR FREE DATA SHEETS**

To keep abreast with bending, write for free copies of "Pines News" — gives complete data on new production applications.

**PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY**

# NEWEST MOTOR TO CARRY UNDERWRITERS' LABEL




**FAIRBANKS-MORSE**

## EXPLOSION PROOF

All new inside and out—new, rugged frame design . . . for new, improved performance in all Class I, Group D, and Class II, Group E, F and G hazardous locations.

Get full information . . . send for Bulletin 1200 on new Fairbanks-Morse line of totally enclosed, explosion-proof motors. Write today: Fairbanks, Morse & Co., Dept. AM-9-9, Chicago 5, Ill.

**FAIRBANKS-MORSE**

*a name worth remembering when you want the BEST*

ELECTRIC MOTORS AND GENERATORS • DIESEL LOCOMOTIVES AND ENGINES • PUMPS • SCALES • RAIL CARS • HOME WATER SERVICE EQUIPMENT • MAGNETOS

# Bridgeport As modern as tomorrow... the machine anticipating future needs

## A "MUST" for today

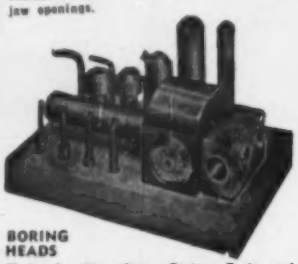
Many shops have modernized their production by replacing obsolete equipment with BRIDGEPORT MILLERS . . . the machines that mill, drill, bore and shape at all angles with one set-up.

These shops *planned* for the future when they installed "BRIDGEPORTS" in their tool rooms, die shops and production lines. They were convinced by the experience of others that their moderate investment in modernization would be returned quickly through economies they could effect, and that obsolescence would be deferred for many years to come.

A most plausible reason for the long time future economy of the "BRIDGEPORT" is not merely its faster, more convenient and closer accuracy in handling a wide range of work but also because improved methods beyond those offered by "BRIDGEPORT" have yet to be developed for practical application.

**MILLING MACHINE VISE**

Improved and providing great gripping power, with large diameter screw for rigid holding. Streamlined for appearance and equipped with coolant trough. Two sizes: 5" x 3½" and 6" x 8" jaw openings.



**BORING HEADS**

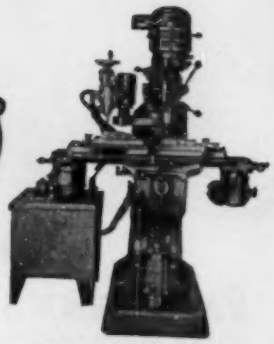
Made in two sizes. Boring Tools and Holder provide means for boring holes up to 6" diameter; available for use on Bridgeport 1 HP Milling, Drilling and Boring Attachment.

**RIGHT ANGLE ATTACHMENTS**

Heavy Duty (shown above) for milling and drilling at right angles . . . fits both Master and 1 HP heads. Also Light Duty for right angle drilling of deep molds and cavities . . . fits Master Head only.

**CHERRYING ATTACHMENT**

Makes possible production of convex and concave shapes; ideal for producing drop forge dies, molds, cavities.



**TRUE TRACE COMBINATION**

The Bridgeport True Trace Combination gives excellent performance and saves endless hours when copying irregular dies and molds.

***Further facts are available through your nearest dealer or through us direct.***

**Bridgeport MACHINES, INC.**

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

# MACHINING PERFECTION always starts with the right steel

*Pick exactly the right steel for any job from J & L's complete cold finished line*

## *"Machines window pivot pins 35% faster with J & L C-1117 leaded steel"*

Conversion to J&L "C-1117" leaded steel from regular "C-1117" steel cut total machining time 35% for this pivot pin used in linkage for turning quarter windows. Cycle time was cut from 3.5 to 2.6 seconds for this part machined from 3/8" cold finished round. J&L leaded steels give you higher cutting speeds, longer tool life, improved finish. Call your local distributor or write to Jones & Laughlin, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

J&L STEEL

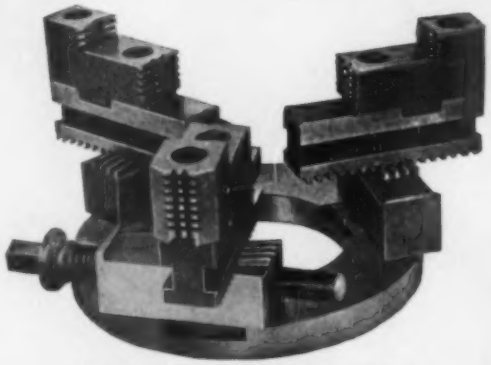
**Jones & Laughlin**

. . . a great name in steel

# FORKARDT CHUCKS

## THE *New* Chuck for Every Type of Work

## One-inch "Teeth" — with Twenty-Ton "Bite"



*Internal working parts of the Forkardt chuck*

**SPECIAL FEATURES:**

- Higher gripping power
- Higher accuracy
- Higher resistance to wear and tear
- Non-divided chuck body—made of steel
- All operating parts made of NITRALLOY STEEL — HARDENED — GROUND
- No bevel wheels
  No toothed wheels spiral threads
- Interchangeable jaws
- Same jaws for External and Internal gripping
- Transmission effected throughout by surface control. Large gear ratio

**HAND OPERATED — POWER OPERATED**

*WRITE FOR LITERATURE*

**PAUL FORKARDT KOMMANDITGESELLSCHAFT DÜSSELDORF**

GERMANY

**U.S. DISTRIBUTOR: MIDWEST-OVERSEAS TRADING CORPORATION, 647 W. VIRGINIA STR., MILWAUKEE 4, WISCONSIN**

The Meehanite spur gears illustrated above have just passed their final inspection before shipment and receive the blessings of inspectors H. Maybury, left; and J. F. Stahl.

These gears, boasting a total rough weight of 14360 lbs. are H-arm type, scheduled for use in rubber-working machinery. Strict adherence to specification, painstaking inspection from first to last—give these—and all gears produced by Stahl, the long, trouble-free service that means greater profit to you.

Pass to the head of the gear parade —get Stahl's estimate next time!

SPURS TO 72" PD, 1 DP

BEVELS TO 54" PD, 1 DP

SPIRAL, HELICAL and WORM GEARS TO 48" PD, 2 DP

CONTINUOUS-TOOTH HERRINGBONE TO 60" PD, 2 DP

SPROCKETS TO 72" PD, 2½" CP

RACKS TO 20 FT. LONG, 3 DP

SILENT GEARS: RAWHIDE, BAKELITE, FIBROIL

HEAT-TREATED, CASE OR FLAME HARDENED GEARS— OF CARBON OR ALLOY STEEL

**Stahl**

**GEAR & MACHINE COMPANY**

3901 Hamilton Ave. Cleveland 14, Ohio

**TANNEWITZ**

VARIABLE SPEED TOOL ROOM BAND SAWS AND HIGH SPEED METAL CUTTING BAND SAWS . . . SINGLE OR VARIABLE . . . 30 TO 15,000 FPM. PRODUCT OF MORE THAN 50 YEARS OF SPECIALIZATION. Write or phone.

The TANNEWITZ WORKS Grand Rapids, Michigan

**DYKEM STEEL BLUE**

Stops Losses making Dies and Templates

Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

*Write for sample on company letterhead*

**THE DYKEM COMPANY**

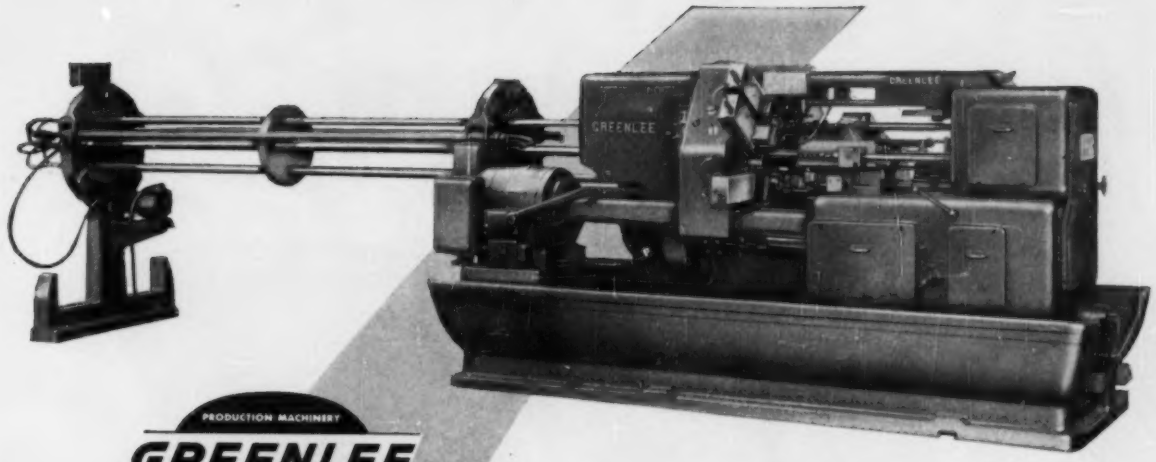
23018 North 11th St. • St. Louis 6, Mo.

**CUT SCRAPER TIME**

**END NIGHT CLEANUP & MORNING REBLUING**

DYKEM HI-SPOT BLUE No. 107 is used to locate high spots when scraping bearing surfaces. As it does not dry, it remains in condition on work indefinitely, saving scraper's time intensely blue, smooth paste spreads thin, transfers clearly. No grit; noninjurious to metal. Uniform. Available in collapsible tubes of three sizes. Order from your supplier. Write for free sample tube on company letterhead.

**THE DYKEM CO., 23018 NORTH 11TH ST., ST. LOUIS 6, MO.**




PRODUCTION MACHINERY
GREENLEE

# AIR-FEED AUTOMATIC

- Permits Greater Job Versatility
- Easily Adapted to Multiple Feedouts
- Provides Longer Stock Feedout
- Eliminates Stock Scoring
- Reduces Stock Reel Noise
- Eliminates Stock Pushers
- Eliminates Feedout Cams

Write today for Catalog A-405, or better still, have the Greenlee man call and show you the way to more profitable production with this air-feed automatic bar machine.

**GREENLEE STANDARD AND SPECIAL MACHINE TOOLS**

- Multiple-Spindle Drilling and Tapping Machines
- Transfer-Type Processing Machines
- Six and Four-Spindle Automatic Bar Machines
- Hydro-Borer Precision Boring Machines

## GREENLEE BROS. & CO.

PRODUCTION MACHINERY
GREENLEE

1729 MASON AVE.
Rockford, Illinois

(PATENT APPLIED FOR)

# NEW MANHATTAN SAFETY BACK FLARED CUP

Not simply a new safety "feature" . . . not merely a design "improvement." Here's a *totally new concept* of flared cup wheel design *and* construction . . . developed by Manhattan engineers to give the greatest safety and performance advantages possible for flared cup wheel users. Manhattan's revolutionary SAFETY BACK Flared Cup puts portable wheel *safety* where it counts the most—in *original* strength and breakage resistance!

SAFETY BACK makes obsolete ordinary safety features such as anchor bushings, safety rings, special hub mountings, or revolving cup guards. With SAFETY BACK, steel covers the *entire* back of the flared cup . . . extends down the side to offer a degree of reinforcement and breakage resistance never before possible!

**NO OTHER WHEEL—AT ANY PRICE—OFFERS THESE EXCLUSIVE FEATURES**

- **Greatest Initial Strength**
- **Highest Safety Factor**
- **Easy Mounting—Easy Operation**
- **Improved Mounting Base**
- **One Piece Assembly**
- **Requires No Adjustment**

Only SAFETY BACK gives you these features—*plus* Manhattan's custom-engineered abrasive bond for *faster* removal of *more* metal on your particular job—at no additional cost! For "More Use per Dollar" in portable grinding operations, you can't get a faster cutting, longer lasting—*safer* wheel than MANHATTAN.

Let a Manhattan abrasive wheel engineer show you the advantages of SAFETY BACK Flared Cups, and other types of Manhattan high speed, heavy duty abrasive wheels. Write for Bulletin 7157.

RM-782

DIAMOND WHEEL INSTITUTE MEMBER

**WRITE TO THE ABRASIVE WHEEL DEPARTMENT**

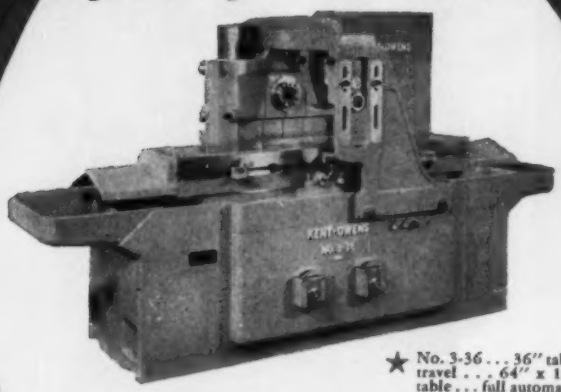
**MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY**

## RAYBESTOS-MANHATTAN, INC.

Belts • Hose • Roll Covering • Tank Linings • Industrial Rubber Specialties • Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

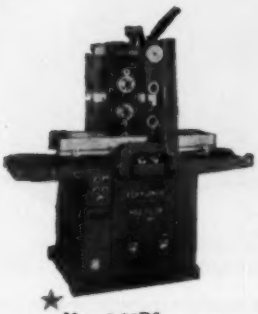
# *Every one a Star*

## for speedy accurate milling!



★ No. 3-36 . . . 36″ table travel . . . 64″ x 16″ table . . . full automatic hydraulic feed.

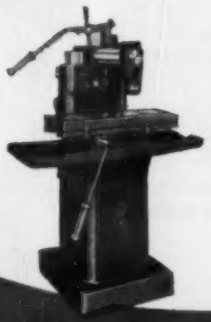
★ No. 2-20 . . . 20″ table travel . . . 42″ x 12″ table . . . full automatic hydraulic feed.



★ No. 2-20DS . . . Double Spindle for two milling operations . . . 20″ table travel . . . 42″ x 12″ table. Hydraulic feed.

You'll turn out milling jobs with stepped up speed and accuracy with the work on Kent-Owens Machines! These extra-rugged Millers are performance-proved . . . simple . . . versatile . . . practical in every detail. Advanced features throughout! Twin-post head mounting assures balanced load. Only two gear contacts, motor to spindle, means greater cutting efficiency. Check your needs! Write today for bulletins on wide range of hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines. Kent-Owens Machine Co., Toledo, Ohio.

★ No. 1-14 . . . 14″ table travel . . . 32″ x 9″ table . . . hydraulic table feed . . . full automatic cycle.



★ No. 1-M . . . Hand feed to table and head . . . 25″ x 9″ table travel . . . head counter-balance is adjustable.

KENT-OWENS REPRESENTATIVES

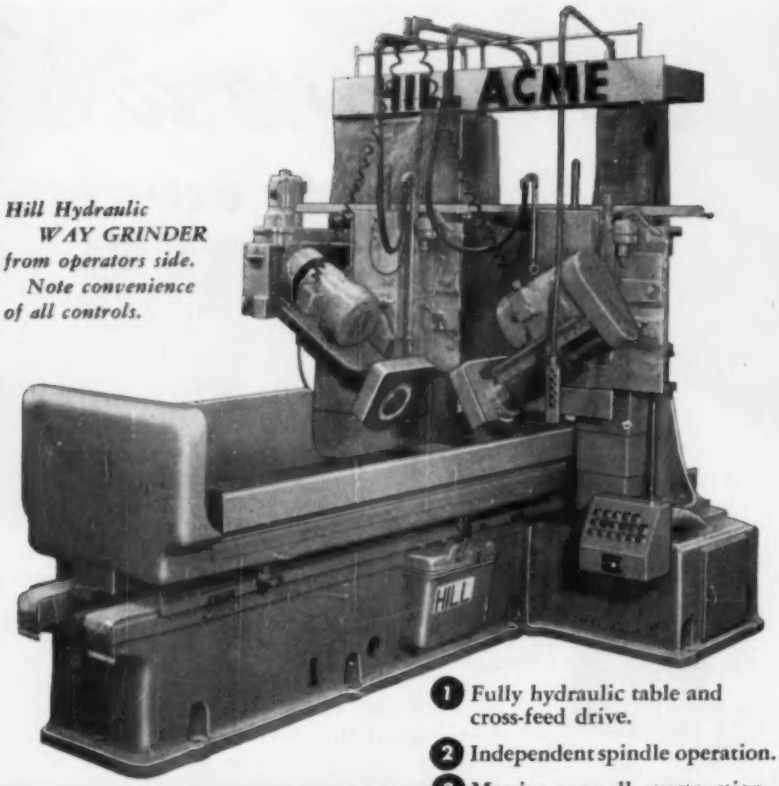
CALL ON

**KENT-OWENS**

*for milling machines*

# HILL double housing WAY GRINDER for accurate grinding of V's, Flats and Angles

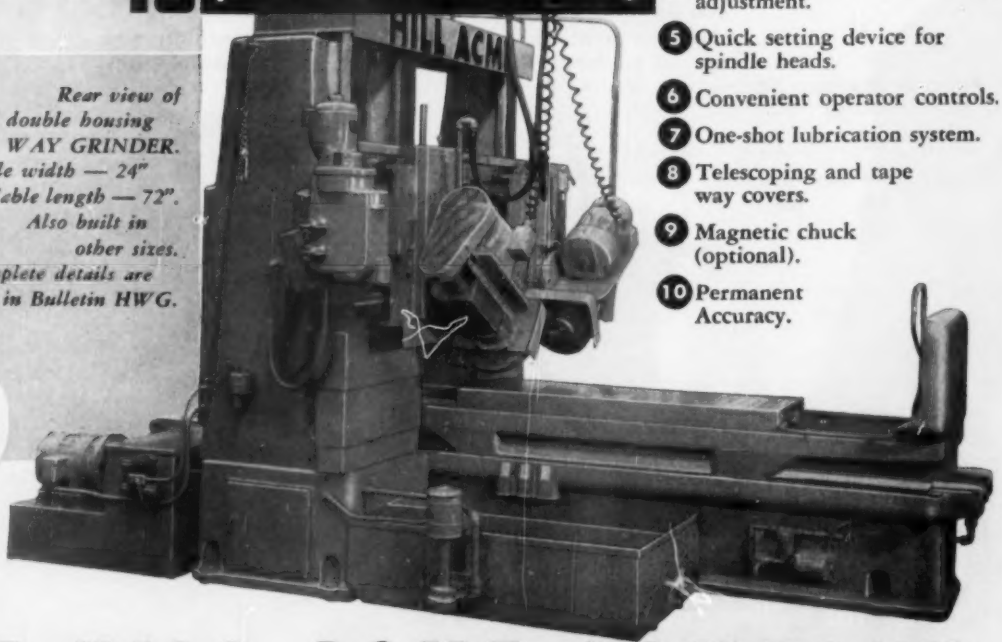
*Substantial Savings (up to 50%) over previous methods.*




*Hill Hydraulic WAY GRINDER from operators side. Note convenience of all controls.*

## 10 points worth considering

1. Fully hydraulic table and cross-feed drive.
2. Independent spindle operation.
3. Massive over-all construction.
4. Rapid traverse and fine feed adjustment.
5. Quick setting device for spindle heads.
6. Convenient operator controls.
7. One-shot lubrication system.
8. Telescoping and tape way covers.
9. Magnetic chuck (optional).
10. Permanent Accuracy.



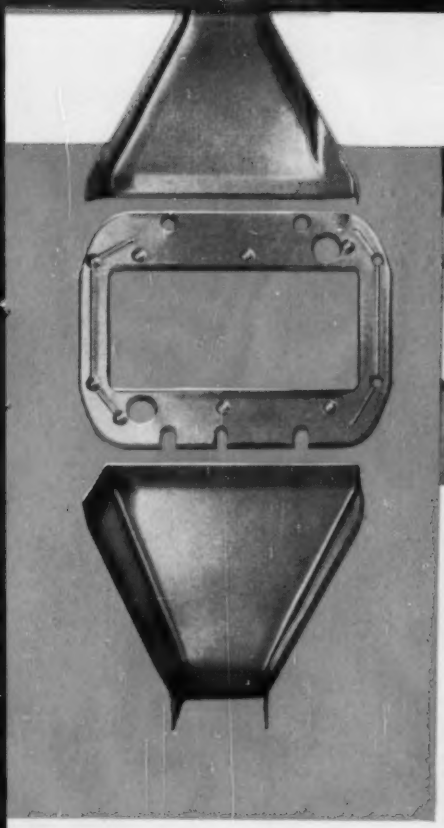

*Rear view of HILL double housing WAY GRINDER. Table width — 24" Table length — 72". Also built in other sizes. Complete details are given in Bulletin HWG.*

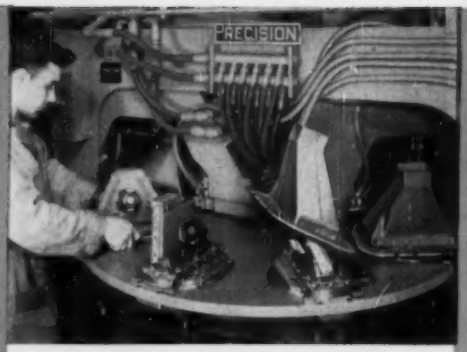
HILL ACME TOOLS FOR INDUSTRY

## THE HILL ACME COMPANY

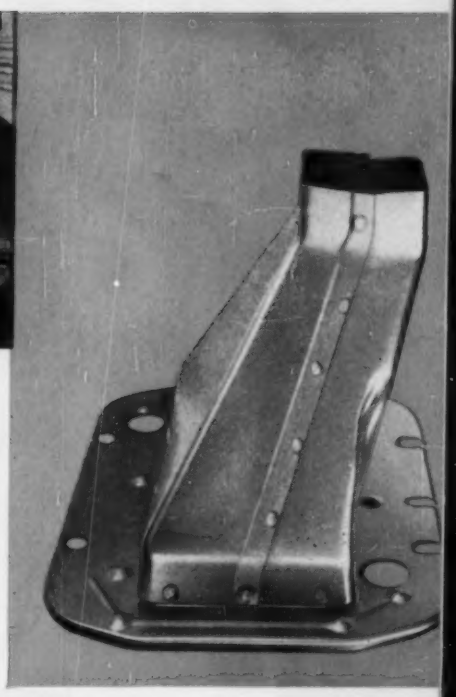
1209 WEST 65th STREET • • • CLEVELAND 2, OHIO

"HILL" GRINDING & POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • ALSO MANUFACTURERS OF "ACME" FORGING THREADING • TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES






**Welding Excellence... a Standard Resistance Welder or...**



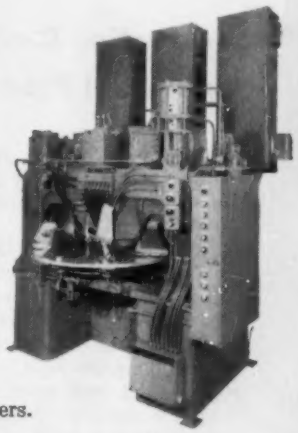
# A Complete Manufacturing Method by Precision

**Your choice:** Buy a standard Precision resistance welder and handle the engineering and tooling details yourself—*or*—buy a complete manufacturing method from Precision. All production-planning, engineering and tooling complete—ready to produce at your rate when delivered.

**Example:** 28 high-strength spot welds, some through triple sheet thickness, to fabricate automotive air ducts. Production: up to 800 parts per hour—22,400 individual welds!

**Precision's packaged manufacturing method:** Specially tooled, 8-station indexing table. Part locating and holding by two electromagnets—spring-loaded tooling to lift completed part from die. Twenty-eight 400 lb. double-acting hydraulic guns. Five 43KVA and two 50KVA transformers, bridge supported for vertical welds. Machine design permits complete accessibility for service.

Avoid many engineering and tooling details. Call Precision in early for your high-production welding jobs. Take "the line of least resistance." Specify Precision resistance welders.



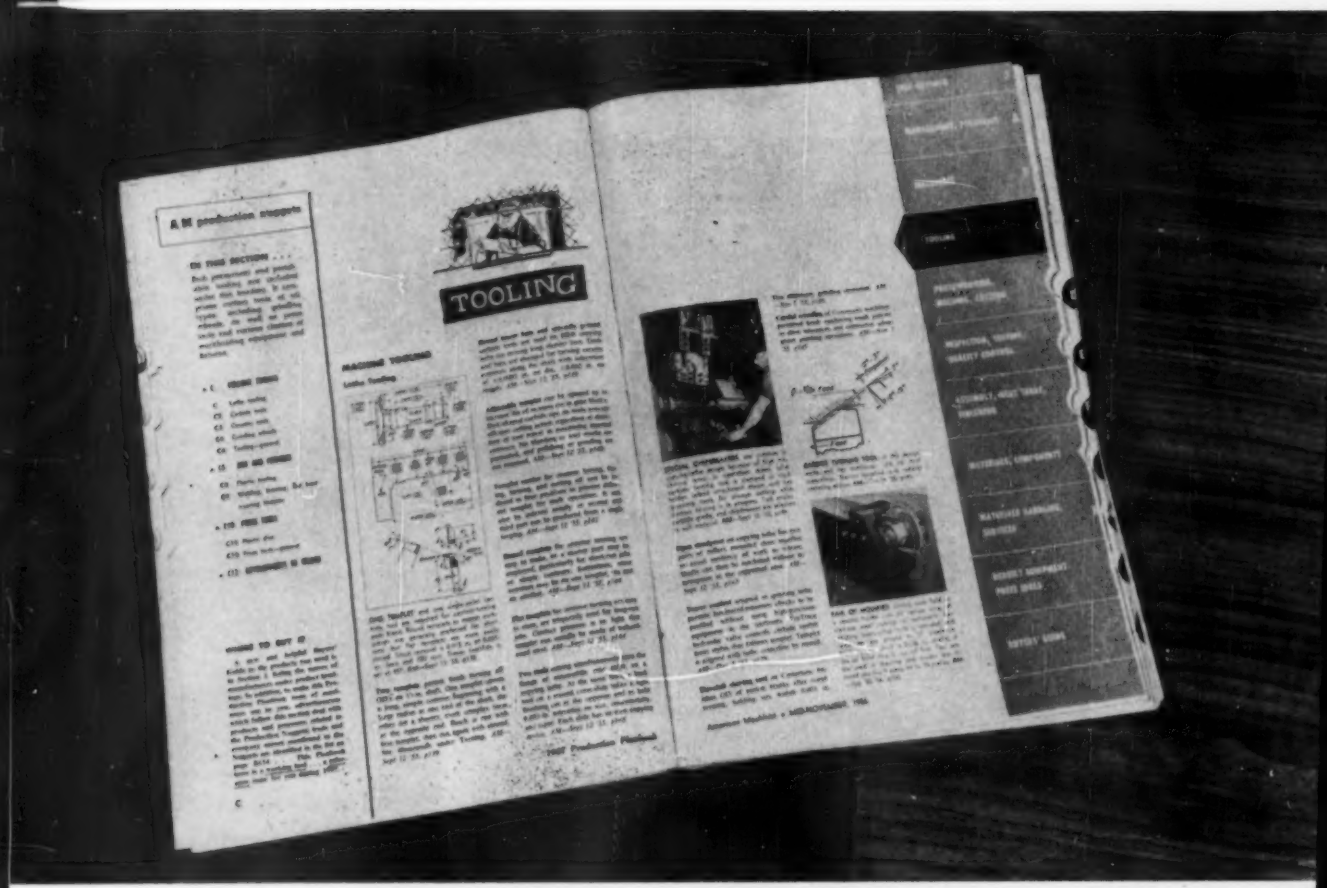
PRECISION

MEMBER RESISTANCE WELDER MANUFACTURERS ASSOCIATION RWMA

**PRECISION WELDER AND FLEXOPRESS CORPORATION**

*3520 Ibsen Avenue, Cincinnati 9, Ohio*

*Builders of all types of Resistance Welders and Automatic High Speed Presses*




# For 201 "hot" ideas on machine tooling... jigs and fixtures... press tools...

## See Section C—Tooling—in your AM Annual Production Planbook and Buyers' Guide Issue

New York—If you're stymied for **tooling ideas** to do the job "right" there's **plenty** of help handy in your American Machinist Production Planbook and Buyers' Guide Issue. Section C is crammed with over 200 tooling **facts** and information items —lathe tooling, carbide and ceramic tools, grinding wheels, plastic dies and tooling, press tools, and welding, brazing and heat-treating fixtures. They are tooling "Nuggets," core ideas extracted from articles published in regular issues of American Machinist. Issue dates and page numbers are shown if you wish to refer to the full text. Many of the original photos, sketches and diagrams are republished in the "Nuggets" section of your Planbook.

**Did you know...?**

For a checklist of modern ideas on tooling, see pages C-12 and C-13, "Tooling Developments to Watch," a highly useful, idea-sparking feature of your Production Planbook. Then, starting on page C-24, is a list of Free Literature offered by tooling manufacturers to enable you to get product information quickly and easily.

Section J, a complete classified Buyers' Guide, lists sources of supply for all the machine tools, tooling, other production equipment, materials, parts and components, and supplies—everything you need to put your ideas to work.

Vendors names shown in bold face type are advertisers in the issue, and page numbers of their advertisements are provided to make easier your job of getting product information.

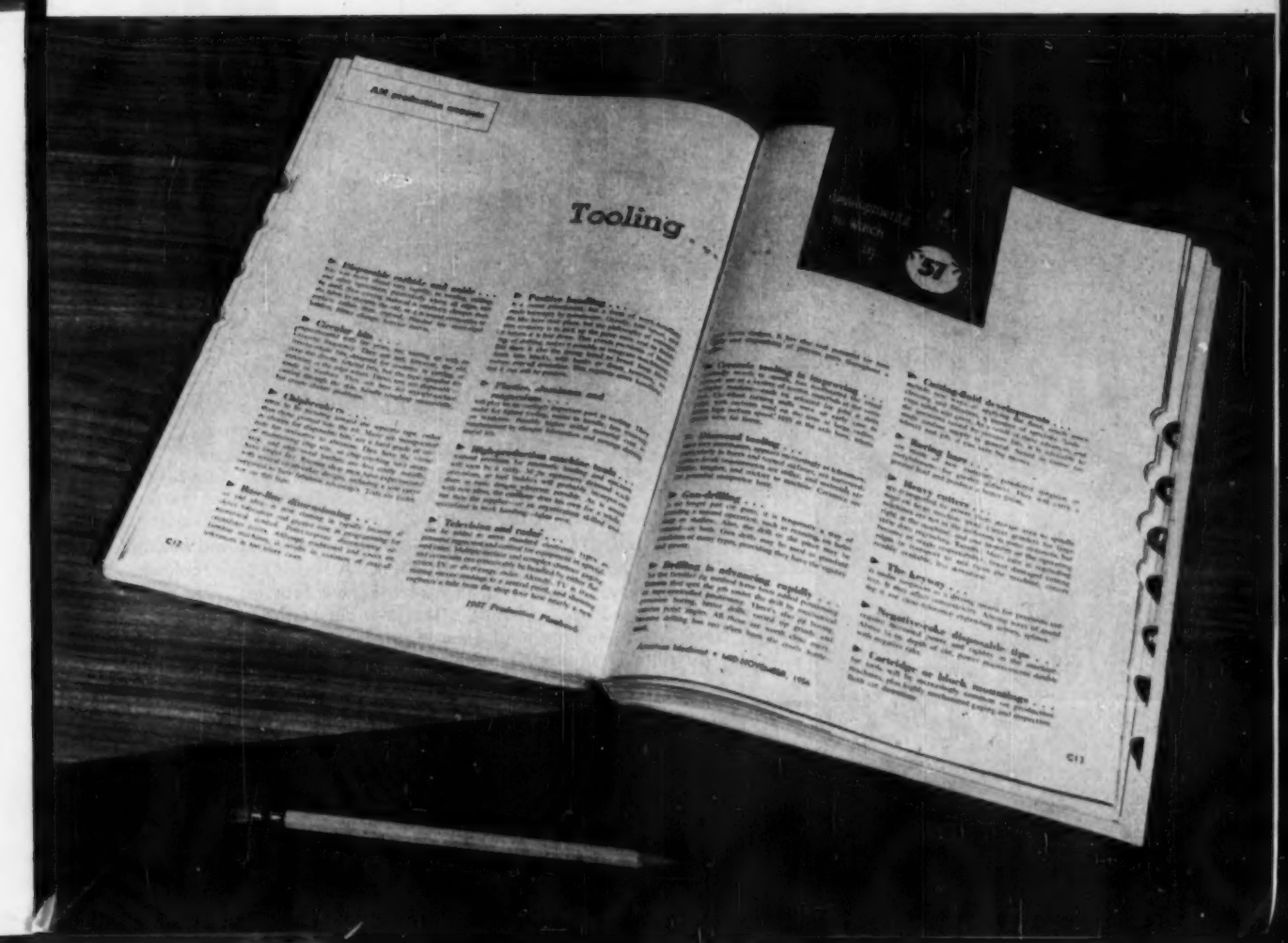
**Coming Mid-September, 1957**

Your 1958 edition of American Machinist's Production Planbook and Buyers' Guide Issue is now in preparation for publication in Mid-September, 1957.

It will again provide you with an easy-to-use, thumb-indexed reference showing "How-to-do-it," "What-to-do-it-with," and "Where-to-buy-it" in a single, manageable, year 'round issue.

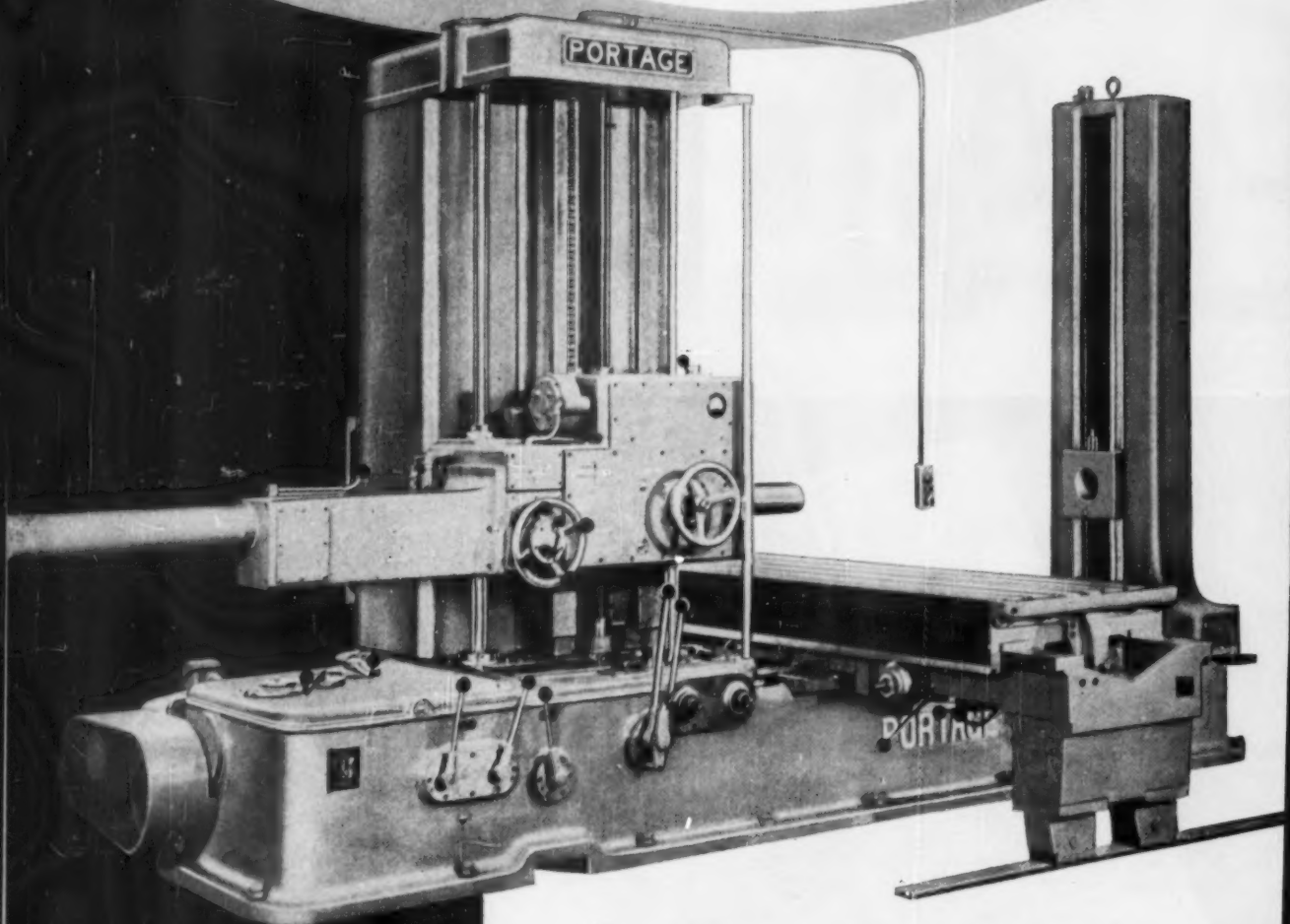
FREE LITERATURE
1957 Production Planbook

1957 BUYERS' GUIDE
FOR METALWORKING


Tooling
57

# PORTAGE *Announces...the*

# NEW LOOK




The new PORTAGE No. 4 Horizontal Boring, Drilling and Milling Machine has a complete NEW LOOK. A heavier base, column, saddle and head are a few of the new features. The overall "beefed up" machine offers a wider range of versatility. NOW... you can handle the larger work . . . with the smallest possible capital investment. Write for complete information.

THE *Portage* MACHINE CO.

1026 Sweitzer Avenue • Akron 11, Ohio

*Representatives in Principal Cities*

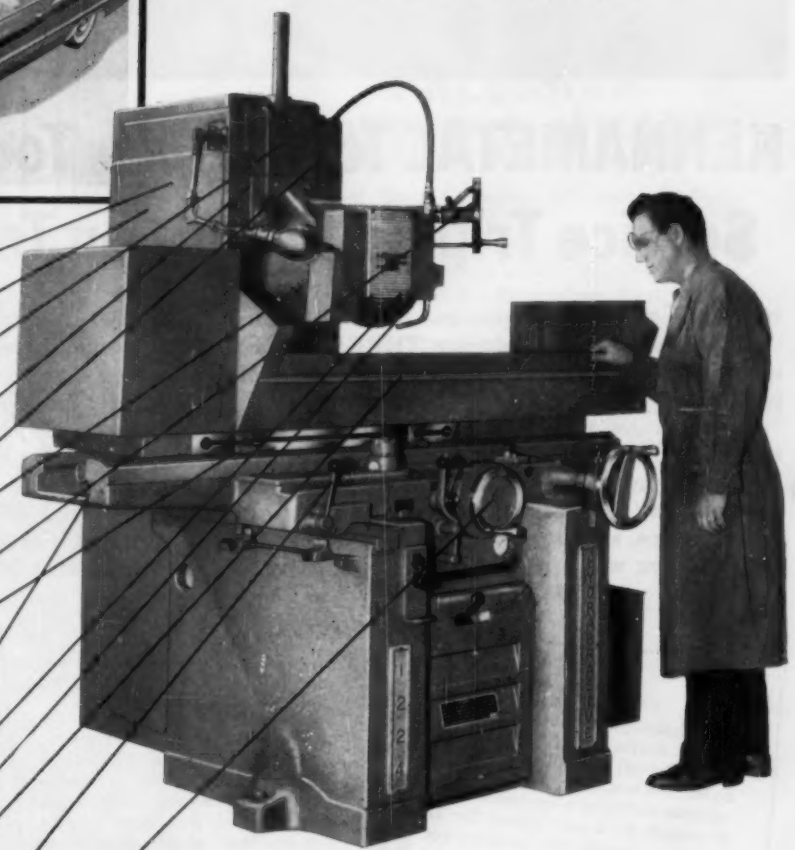
*BUILDERS OF PRECISION MACHINE TOOLS, SPECIAL AND PRODUCTION MACHINERY SINCE 19*

Tools and parts for the finest products
in the world are ground on ABRASIVE
Precision Surface Grinders
ABRASIVE
MACHINE TOOL COMPANY

*Here they are . . .*
*"Operator-Engineered"*
*Features that mean*
*high finishes –*
*effortlessly*

# NEW HYDRABRASIVE

*Precision*
*Surface Grinders*



No trouble with this rugged column shifting or moving out of line.

Easy to keep clean — modern lines with smooth surfaces.

Column ways are kept free of dirt with these guards.

Head will never wobble like an extension ladder — these bearing surfaces never diminish.

Column ways are lubricated for you as head travels up and down.

Forget spindle lubrication. It's lifetime sealed. Motorized, of course.

No back-breaking crouching to line up work with elevating wheel located here.

No busted knuckles adjusting these table travel dogs.

Never any drag on these ways. Coolant and grit is kept out by patented shields totally enclosing ways.

No danger of flying fragments, no pesky vibration with this heavy cast iron wheel guard.

No wasted time removing metal with this big 12" wheel.

Telescoping waterguards easily adjust.

Power feed and handfeed—standard equipment — can be interchanged without waiting for oil to drain out of cylinders. Safe, too!

You will like the solid feel of these smooth, recessed hand controls. And, the graduations are direct, big and easy to read.

Heat expansion won't spoil your work with this air cooling, coupled with simple, low pressure hydraulic system. You can roll the entire unit right out this door, too.

You won't stub your toes trying to get close to these grinders.

Hydrabrasive 824 — 8" x 24" x 12"
Hydrabrasive 1218 — 12" x 18" x 12"
Hydrabrasive 1224 — 12" x 24" x 12"

**ABRASIVE**
MACHINE TOOL COMPANY
EAST PROVIDENCE, RHODE ISLAND

**FREE!** All Hydrabrasive "operator-engineered" features are fully illustrated and described in this big 6 page catalog. Write for your copy now.

# KENNAMETAL* Tooling *plus* Tool Engineering Service Tripled Return on Tooling Dollars

It doesn't show in the picture—but the Kendex tooling illustrated is producing THREE TIMES more parts per tool dollar than the clamped tools previously used. For Proof—see Case I below.

In many cases, results like these can't be obtained by "off the shelf" tools and "off the cuff" methods. Today's many new alloys and multitude of operations call for (1) scientific job analysis, to determine proper setups, speeds, feeds, and cuts, (2) scientific tool selection which may call for special tools for complex operations, and (3) machinist cooperation, to assure correct procedure. Kennametal's experienced Tool Engineers will work with your tool engineers and operating men in getting the right tool on each job. If standard Kennametal tooling does not cover the job . . . your Kennametal representative can make proper recommendations as all Kennametal field men are specially-trained tool engineers. For more information . . . just write to KENNAMETAL INC., Latrobe, Penna., Department KE.

*Trademark

C-3077

### CASE I

Job illustrated above is profiling motor shafts of SAE 1045 and 4150; Brinell 200-300; length, 24" to 96". When clamped tools with various carbides were used, costs averaged $311 per month for 18 months' continuous production. Kendex tools with Kennametal Grade K21 throw-away inserts, in the first half-year period, cut the cost to $102.70 per month. (For detailed data, ask for Performance Report No. 540.)

### CASE II

In a production run turning countershaft pinions, SAE 4140; Brinell 212; length 4½"; Kendex tooling with the same K21 grade of insert cut tool cost to one-seventh that of previously-used insert tools. (Details—Performance Report No. 533.)

### CASE III

In turning alloy steel rotor shafts, 34 to 36 Rockwell C, tool cost per piece was reduced from $.041 to $.022 when brazed tools were replaced with Kendex Roller Turner and Grade K21 inserts. Added savings came from higher speeds and less downtime. (Performance Report No. 537.)

INDUSTRY AND KENNAMETAL ...Partners in Progress

# Last word in capacity, accuracy and speed!

## KNIGHT'S NEW No. 60 VERSATILE VERTICAL for PRECISION BORING & MILLING

**Unusual Extra Capacity.** 18" cross feed—30" vertical travel

**Rugged Bed-Type Table.** Has 3-way bearing. Bed 36" wide; saddle 46" long

**Convenient, Simple Operation.** Longitudinal handwheel in front; easily moved counterbalanced spindle and spindle head

**Choice Of 3 Measuring Methods.** Hardened and ground precision screws—locating counters—dial indicator equipment

**Many Other Exclusive Features.** Mail coupon today for complete information

**TWO TABLE SIZES**
18" x 52"—28" longitudinal travel
18" x 60"—36" longitudinal travel

KNIGHT

**W. B. KNIGHT MACHINERY CO.**
3920 WEST PINE BLVD. ST. LOUIS 8, MO.

ATTACH TO COMPANY LETTERHEAD

W. B. KNIGHT MACHINERY CO.
3920 West Pine Blvd., St. Louis 8, Mo.
Send complete information on new No. 60 Vertical.

Name.....

Title.....

☐ Have representative call

# Inland Ledloy*...the original leaded steels

It is not by chance that Inland Ledloy steels have set the standards with which all other free machining steels are compared. Almost twenty years have passed since Inland started a metal-working revolution with its discovery of how to add lead to steel—years in which Inland has refined and developed its techniques and gained the practical daily production experience that has made Inland world leader in the production of fine leaded steels.

This is a typical and frequent scene at Inland. Here, where leaded steels were first developed, come cold drawers, warehousemen, and users of Ledloy steels from many countries. The visitors, in this photograph, listening intently as an Inland production specialist explains a step in the making of Ledloy, come from Paris. They are Messieurs Gay and Coevoet of DAVUM, largest steel warehouse in France.

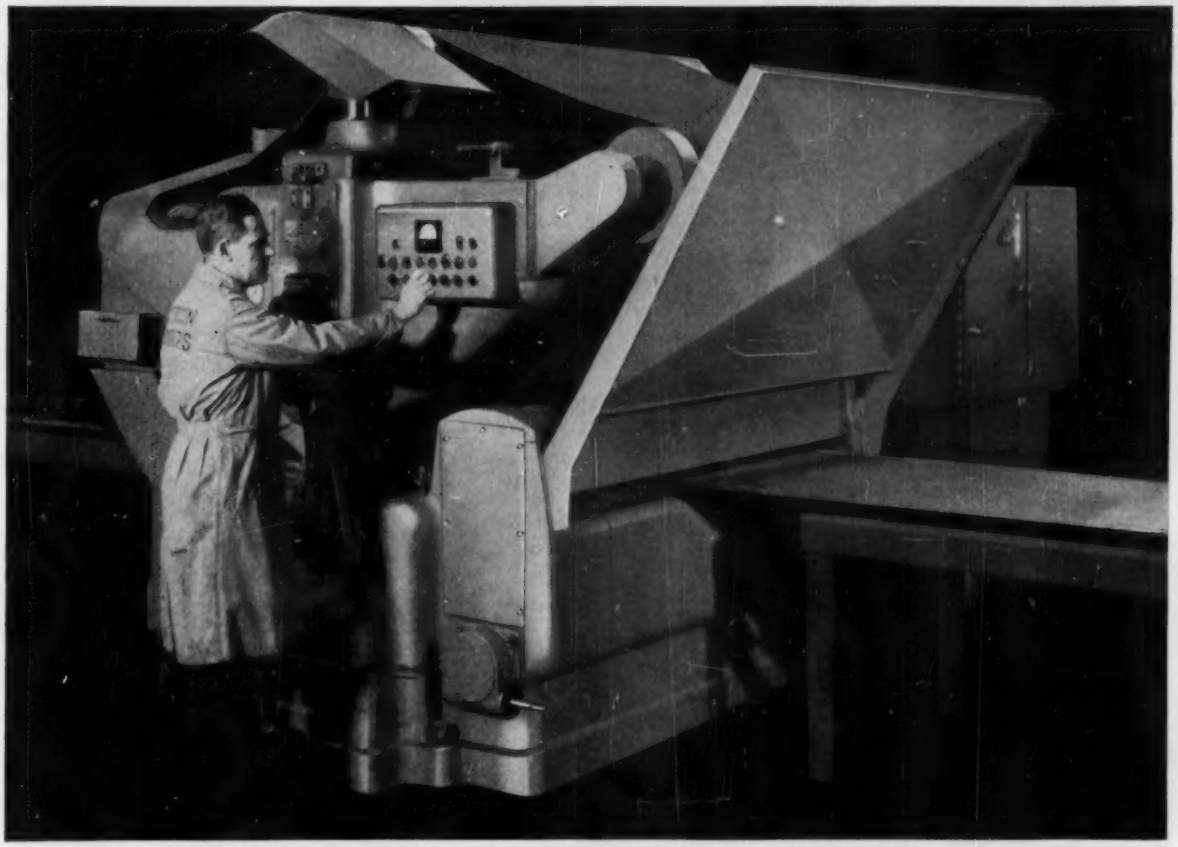
Following the war, as more and more people became acquainted with these fast-cutting steels, Ledloy rapidly gained in popularity and came into widespread use. Today Ledloy, originated and developed by Inland, is made overseas under license from Inland and used extensively in almost every nation in Europe and in countries the world over.

# Experience makes Inland Ledloy better

*INLAND LEDLOY is sold in cold drawn form, under various trade names, by leading cold drawers and steel warehouses from coast to coast.*

***INLAND STEEL COMPANY** 38 South Dearborn Street • Chicago, Illinois Sales Offices: Chicago, Milwaukee, St. Paul, Davenport, St. Louis, Kansas City, Indianapolis, Detroit, New York • *registered trade name of Inland Steel Company, pioneer in the development of leaded steels.*

# GRINDS SHEET STEEL OR STRIP TO IMPROVED FINISH IN A SINGLE PASS!



## Rugged New Pinch Roll Grinder by Mattison eliminates chatter and revolution marks!

Put a stop to customer rejects and speed production of titanium, zirconium, stainless, and carbon steel sheets, plates, or strip . . . grind to correct gauge thickness . . . and make your production more automatic by installing this new Mattison No. 456 Pinch Roll Grinder. It's a heavier, more rugged machine capable of producing No. 3 finish with a 100 grit belt *in a single pass*. Diamond design improves belt performance and reduces belt cost. There's no vibration or chatter —you get high-quality finishes even on light-gauge steel. High horsepower permits you to grind accurately to size. Positive stops control parallelism within close limits. Photocell control of the grinding aperture (optional) prevents the leading edge of the sheet from marking the belt, eliminating "pickup" on subsequent sheets.

MATTISON MACHINE WORKS ROCKFORD, ILL. U.S.A.

**HIGH-POWERED PRECISION SURFACE GRINDERS**

**NO. 455 RECIPROCATING TABLE SHEET POLISHER**

Has same smooth, rugged head unit as No. 456. "Floats" sheets against contact roll for fine polishing.

Used in many plants for putting on a final finish after preliminary grinding on the No. 456.

**SEND** for new illustrative bulletin, with complete facts and features.

**Mattison Machine Works**
**545 Blackhawk Park Avenue, Rockford, Illinois**

- ☐ Please send bulletin on No. 456 Pinch Roll Grinder.
- ☐ Please send bulletin on No. 455 Wide-Belt Sheet Grinding and Polishing Machine.
- ☐ Please send literature describing Tube Grinders.

Name_____ Title_____

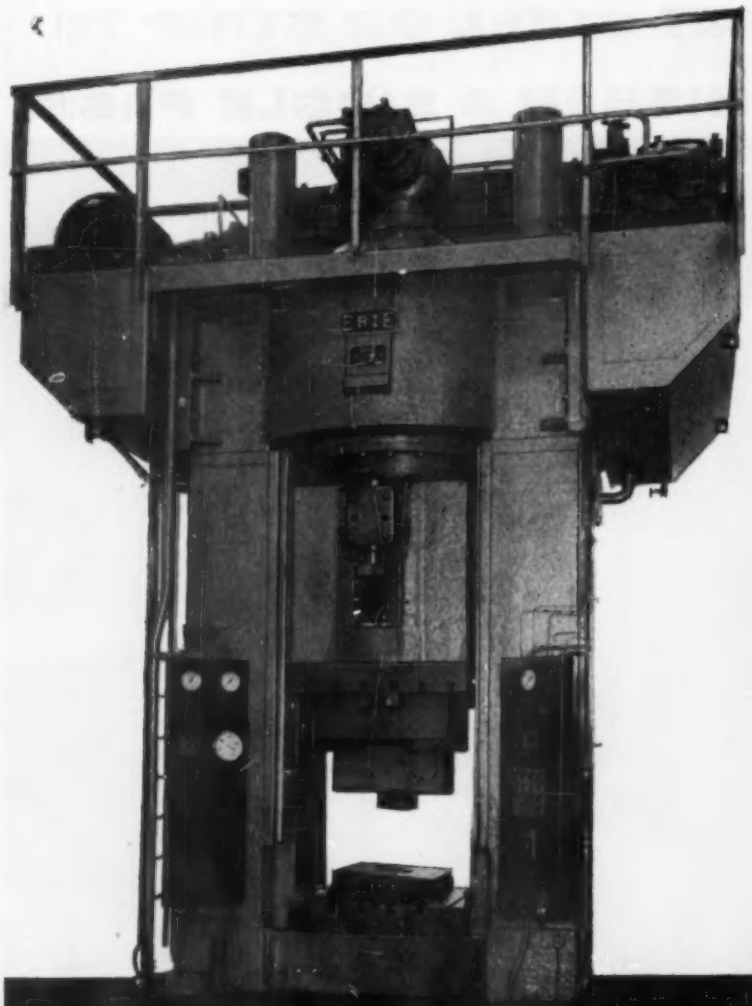
Company_____

Address_____

City_____ Zone_____ State_____



Roll it Anywhere for Fast High-Pressure Service!




**ELECTRO-MAGNETIC CONTROL**

All controls are grouped on one accessible control panel which allows delicate finger-tip control by the operator . . . the machine responds *instantly*. This control allows any speed of ram travel in either direction.

**SEMI-AUTOMATIC OPERATION**

The forging cycle can be pre-set to incorporate any speed and tonnage—advance, press, slow return, fast return.

**REMOTE MANUAL CONTROL**

Manual control is easily detached from the control panel by the operator who is free to control the press from any nearby position.

**HYDRAULIC TOP & BOTTOM STRIPPERS**

Can be set to eject the forging from the die at *any* position.

**NEW ADJUSTABLE GUIDES**

Insure accurate platen alignment and *requires no shimming*. Adjustment can be made in less than an hour.

# ERIE FOUNDRY'S NEW HYDRAULIC PRESS

*with electro-magnetic control*

# produces precision forgings

**1500-TON FORGING PRESS**

| | |
|---|---|
| platen size: | 48" x 48" |
| opening: | 60" |
| stroke: | 48" |
| speeds—advance: | 400" per minute |
| press: | adjustable from 0" to 52" per minute |
| slow return: | adjustable from 0" to 52" per minute |
| fast return: | 360" per minute |
| hydraulic components: | Oilgear with Raytheon Servo-control |

The Erie Foundry Hydraulic Forging Press was specially designed for no-draft non-ferrous forging. Modifications of this rigidly built, self-contained machine can be supplied to your forging requirements. For more information, please write.

ERIE

*Hydraulic Press Division*

**ERIE FOUNDRY CO.**
**ERIE 4, PA.**

GREATEST NAME IN FORGING MACHINERY SINCE 1895

*Roll It Anywhere for Fast High-Pressure Service!*

# ALEMITE PORTABLE POWER GUN

## For EVERY Plant Lubrication Job!

## "AIR-POWERED 711-A"

**FASTER**—because it's easier to handle! Saves lubrication time outdoors or indoors—anywhere in the plant. Pivot-swing dolly holds container upright at any pulling angle.

**FASTER**—because exclusive, newly designed pump packs more than enough power for every job. Delivers 14½ oz. of gun grease per minute at 70°F. Holds 25-, 35-, or 50-lb. pail—or 70 lbs. of grease. Dynamic primer assures positive priming.

### Pivot-Swing Dolly For Easy Moving...

**Electric-Powered "Porta-Kart"**
Only 18" wide. Easily moves through narrow aisles. Capacity, 12 pounds. Delivers 13 oz. of pressure gun grease per minute. Automatic switch shuts off motor when 5,000 lbs. of pressure is built up. *Model 7182-B.*

**Step up to modern, time-saving lubrication methods! Check Alemite's complete line of air-powered and electric-powered lubricators.**

**ALEMITE** STEWART SW WARNER

Division of STEWART-WARNER CORPORATION

### MAIL COUPON FOR FREE CATALOG!

**Alemite, Dept. F-97, 1850 Diversey Parkway**
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**Please send me your complete catalog on Alemite lubrication equipment for industry.**

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Scott Wipers* are wonderful for wiping oily machines, tools, hands, face! They're soft, absorbent, 2-ply paper chemically treated and Perf-embossed.® This exclusive process creates angled surfaces for perfect cleaning action, fast absorption of liquids. *PATENT PENDING

# WIPER PROBLEM? Look what National Broach and Machine did with Scott Wipers!

National Broach & Machine Company, Detroit, is the world's largest producer of gear finishing machines. Management switched to Scott Wipers, after long use of rags for industrial wiping, because:

a) Scott Wipers were found to be less expensive, lint-free, uniform, more sanitary, easily disposable.

b) Scott Wipers help maintain good housekeeping.

c) Scott Wipers, furnished to each user, save much time formerly lost in going after clean wipers.

d) Scott Wipers fresh from the box are always clean—no clinging metallic particles to scratch and cut.

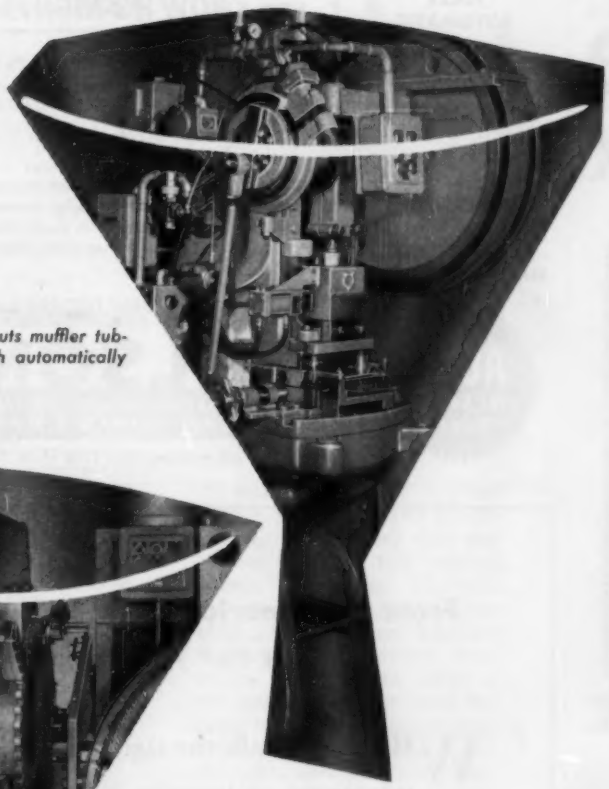
Today, Scott Wipers are used by this firm for 80% of all wiping needs: machines, tools, stock, instruments, hands, faces, workers' glasses. They have effected a saving of nearly $2,000 annually!

If you'd like to improve your wiping operation like this, call your local Scott distributor or write Scott Paper Company, Department AM-79, Chester, Pennsylvania.

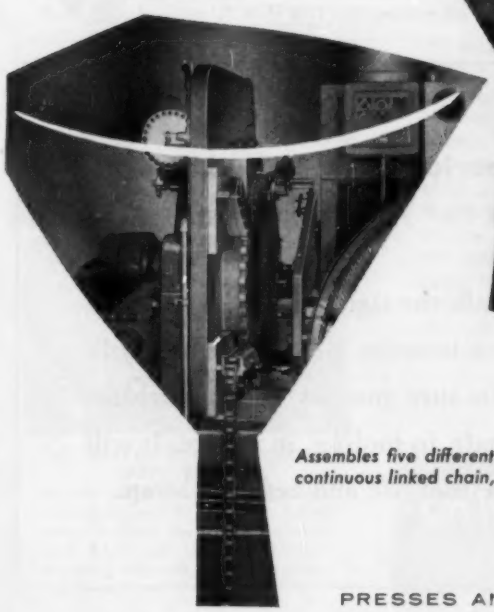
SCOTT PAPER

Maker of the famous Scott paper products you use at home. See "Father Knows Best" and "The Gisele MacKenzie Show" on NBC-TV.

*Stamps out fins in progressive die, then stacks them onto tubes*



*Feeds and cuts muffler tubing to length automatically*



*Assembles five different parts into continuous linked chain, spins rivet*

**FUNNEL TO SAVINGS IN HANDLING AND MOTION**

# COMBINED OPERATIONS ON V & O EQUIPPED PRESSES

Each of the above units (designed and built by V & O) "funnels" two or more operations into an integrated system of parts production. Eliminated are such intermediate tasks as materials-handling between machines, hand-placing of partly finished pieces in dies, and separate inspections of parts in process.

All three units are based on standard types of V & O presses. Even the chainmaking press, which is on its back to facilitate tool operation, follows a precedent well-established by V & O. Of equal importance is the fact that V & O presses are especially designed for combined operations. Featuring long slide precision, they have the accuracy, sturdiness and adaptability essential to long die life and smoothly functioning feeds and attachments.

Remember, too, that we probably have more experience in equipping presses for automatic methods than anyone else. We have been doing it since 1889. Why not put this experience to work now—it can mean important cost reductions in your production operations.

**THE V & O PRESS COMPANY**

Division of Emhart Mfg. Co.

301 UNION TURNPIKE, HUDSON, NEW YORK

PRESSES AND METHODS THAT AUTOMATICALLY REDUCE COSTS

TORIT MFG. CO., Attn.: Mr. Chase, Sales Mgr.
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Please send me your new free Handbook, "Torit's Guide to Modern Dust Collection".

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COMPANY_____

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CITY_____ ZONE_____ STATE_____

# new free handbook

to answer your dust problems

*Mail coupon for details on lower costs, higher worker morale possible with Torit Dust Collectors.*

Here are up-to-date facts on industrial dust problems. How to solve them efficiently at low cost with flexible, economical Torit Dust Collectors. Details on all Torit units, helpful information, charts, applications, etc. 28 pages, fully illustrated and it's yours FREE. Write or use coupon above for your copy today.

**TORIT MANUFACTURING CO.**
311 Walnut Street, St. Paul 2, Minn. Dept. 406

A FULL WILSON LINE TO MEET EVERY HARDNESS TESTING REQUIREMENT

**FULLY AUTOMATIC**
•
**SEMI-AUTOMATIC**
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**REGULAR**
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**SPECIAL**
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**SUPERFICIAL**
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**MICRO & MACRO HARDNESS TESTERS**

## When it's WILSON "ROCKWELL"-TESTED *you KNOW it's RIGHT!*

***Easy to operate*** — all controls at hand

***Takes rough service*** — maintains accuracy after years of operation

***Expert Wilson service*** — helps you choose proper model—keeps it at work.

A staff of WILSON hardness testing experts is available to help choose the model best suited to your job—and provide quick emergency service if it is ever needed.

*Write for booklet DH-325 today*

ACCO for Better Values

**WILSON**
MECHANICAL INSTRUMENT DIVISION
AMERICAN CHAIN & CABLE
230-8 Park Avenue, New York 17, N. Y.

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## From the *American Machinist* Library of *Tips for Top Shop Men*

WHEN you walk the tight-rope between close tolerances, or between good and bad finish, balance is vital. Be sure you have it, in machine-tool spindle or shaft, in tooling, in fixture. It will pay out in longer tool life and reduced scrap.

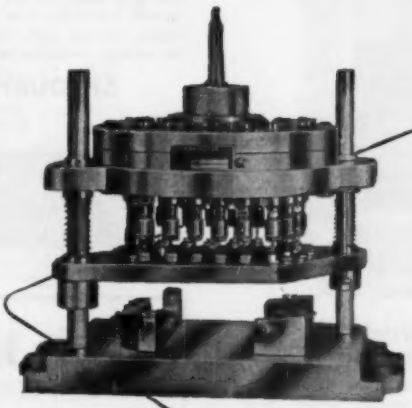
**FULLY ADJUSTABLE DRILLING HEAD**

Here's a light, compact tool with a wide range of adjustment. Can drill on squares, rectangles, circles, triangles and irregular patterns.

FOR MULTIPLE DRILLING OF HOLES ON PRODUCTION RUNS . . .

# ERRINGTON

## FIXED CENTER DRILLING HEADS with JIGS and FIXTURES



*Custom Built to Your Specifications. Send Blueprint for Quotation Without Obligation.*

**ADJUSTABLE TAPPING HEAD**

Fully geared. Needle bearings on all spindles in head. Ball thrust bearings throughout. Bronze bushed. Sand cast aluminum case.

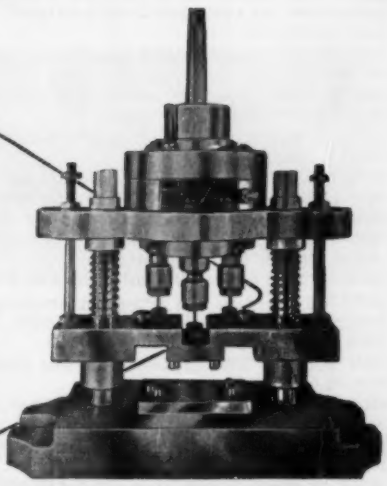
**ADJUSTABLE DRILLING HEAD**

This versatile tool permits you to take advantage of a wide range of adjustment without overhang.

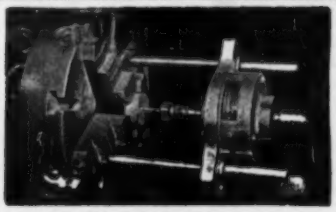
**UNIVERSAL JOINT DRILLING HEAD**

This dependable tool is adjustable to any pattern of holes. Available with 4 to 12 spindles. All aluminum housing construction, thrust bearings and gears turned on spindles.

Do more . . . and do it better with Errington Fixed Center Drilling Heads. They drill any number of varied size holes on different elevations. The head has grooved thrust ball bearings at all thrust points and hardened bronze radial bearings. Heat treated spindles and gears, of one piece turned from solid bar stock. It is geared approximately 2:1. All enclosed in a sand-cast aluminum case and cover, with alemite pressure lubrication.



*Send for Complete Catalog*



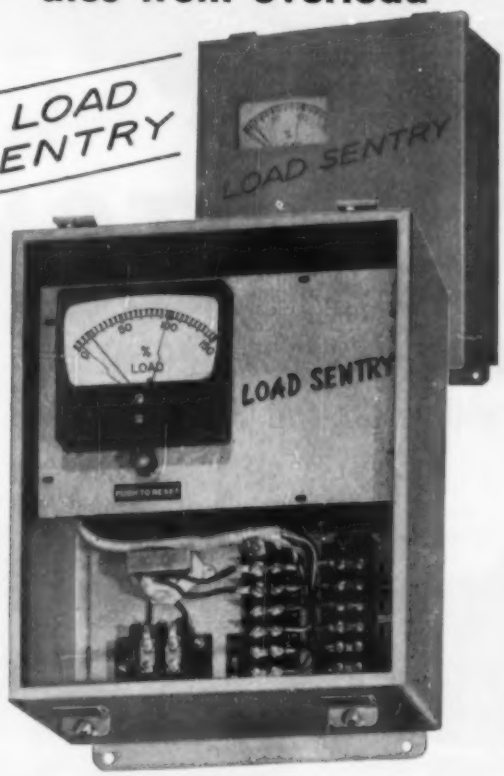
**AUTO-REVERSE TURRET LATHE TAPPING HEAD**

A new tool, practical, time-saving, money-saving. In a turret lathe setup it allows you to tap the hole and back out the tap without stopping the work or reversing the machine.

**ERRINGTON** MECHANICAL LABORATORY, INC.
Established 1891
Main Office and Plant: STATEN ISLAND 4, N. Y.
Export Office: STATES TRADING COMPANY 401 Broadway, New York 13 Cable Address: STRADESCO, N. Y.

## Protects motors, tools and dies from overload

LOAD SENTRY




**Load Sentry, NEMA 12 Housing, Phase Failure Protection • Price $240.00**

With one pointer, you set the load limit anywhere on the dial. Another pointer shows running load on the motor. If an overload occurs, these pointers meet and a protective circuit is energized, or the motor is shut down, as preferred.

EASY TO ORDER: Specify motor full load current; or horsepower, voltage, and phase.

EASY TO INSTALL: Eight easy connections to make—any plant engineer, electrician or maintenance man can do it.

RELIABLE: No electron tubes. "Fail-Safe" circuitry engages protective circuit if component fails.

ACCURATE: Meter-relay "heart" is able to detect two pieces of stock moving through a progressive die; 3% load increase will trigger protective circuit.

SAFE: After overload, an interlock prevents start-up until overload is cleared and reset button is pressed.

FAST: Shutdown or alarm is virtually immediate if overload occurs.

VERSATILE: Adjustable load setting and interchangeable current transformers make LOAD SENTRY usable on any motor. Can be wired to shut down motor, disengage clutch, or give alarm.

UNAFFECTED BY STARTING SURGE: No false shutdown while motor is drawing heavy starting current.

INDICATING: Motor current is continuously shown.

EQUIPPED WITH PHASE FAILURE PROTECTION: A fixed "low limit" alarm pointer gives protection if one phase of a three phase system goes out (optional).

BUILT IN NEMA 12 (standard), WALL CABINET, OR PANELMOUNT HOUSINGS.

*Ask for Data Sheet 7*

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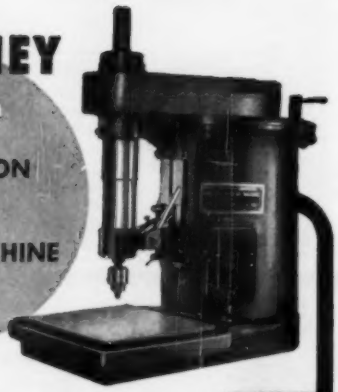
## SIGOURNEY

**M-100**

*the* PRECISION BENCH DRILLING MACHINE



No ordinary bench drilling machine, but an extremely accurate, high speed, sensitive machine for precision drilling. Drills from ¼" down to extremely small sizes. Successfully used down as far as .008".

Table and column exactly squared, one to the other, and built with strength and rigidity for maintained accuracy. Hardened and ground spindles insure long life. Sealed ball bearings throughout for smooth operation from 4,000 r.p.m. to 10,000 r.p.m. Motor, driving belt, and spindles entirely enclosed for safety. Available with 1, 2, 3 and 4 spindles.

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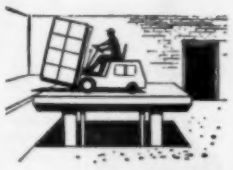
WITH DEPENDABLE HYDRAULIC POWER

Load trucks from floor level . . . no dock needed



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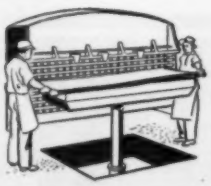

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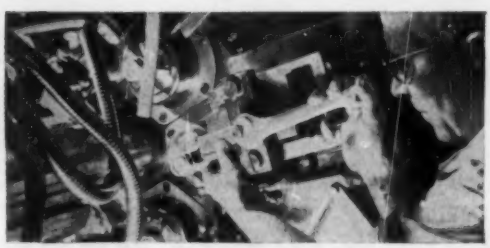
**One of the most important operations in producing Elastic Stop nuts from Youngstown Cold Finished Bars. Here the bar is being cut to length to form the basic nut blank. Six spindle screws of the Automatic drill and ream the tap hole, cut and form the unclosed crown, drill and ream the insert well and finally, cut off the finished nut blank. The cold finished bar's quality must not vary as any hidden seams, pipes or center segregations could cause tooling and production breakdowns.**

Youngstown Cold Finished Bars and Scrapless Nut Quality Wire play an important part in the "Elastic Stop Nut Story". They're the basic raw material used to produce these well-known self-locking fasteners familiar to almost every industry throughout the world.

These Youngstown products give Elastic Stop Nut Corporation of America long, trouble-free production runs. That's because they are quality-controlled throughout all of Youngstown's integrated steelmaking operations—from mining the iron ore to final cold drawing.

They give your operators the best chemical composition, physical structure and surface finish—a direct result of Youngstown's more than a half-century of quality steelmaking know-how. Why not make them your permanent specification for continuing high product quality and uniformity.

For more detailed information or metallurgical assistance, write or call our nearest District Sales Office today—or write directly to our General Office.



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AND SCRAPLESS NUT
QUALITY WIRE

QUALITY YOUNGSTOWN SERVICE

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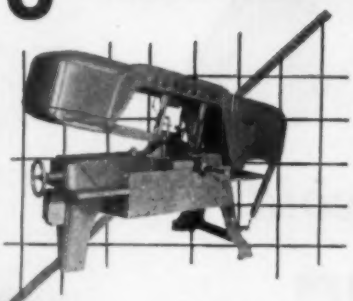

**MODEL B**

Stop losing man hours on slow, inefficient metal cutting machines. Specify a Johnson Model B (wet or dry) Saw for top production. Variable speed. Saws 5" rounds, 10" flats, odd and irregular shapes too. Can be caster equipped for portability.

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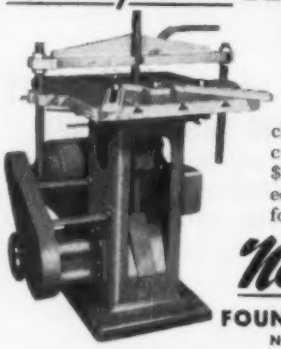
# Northfield KEYSEATER



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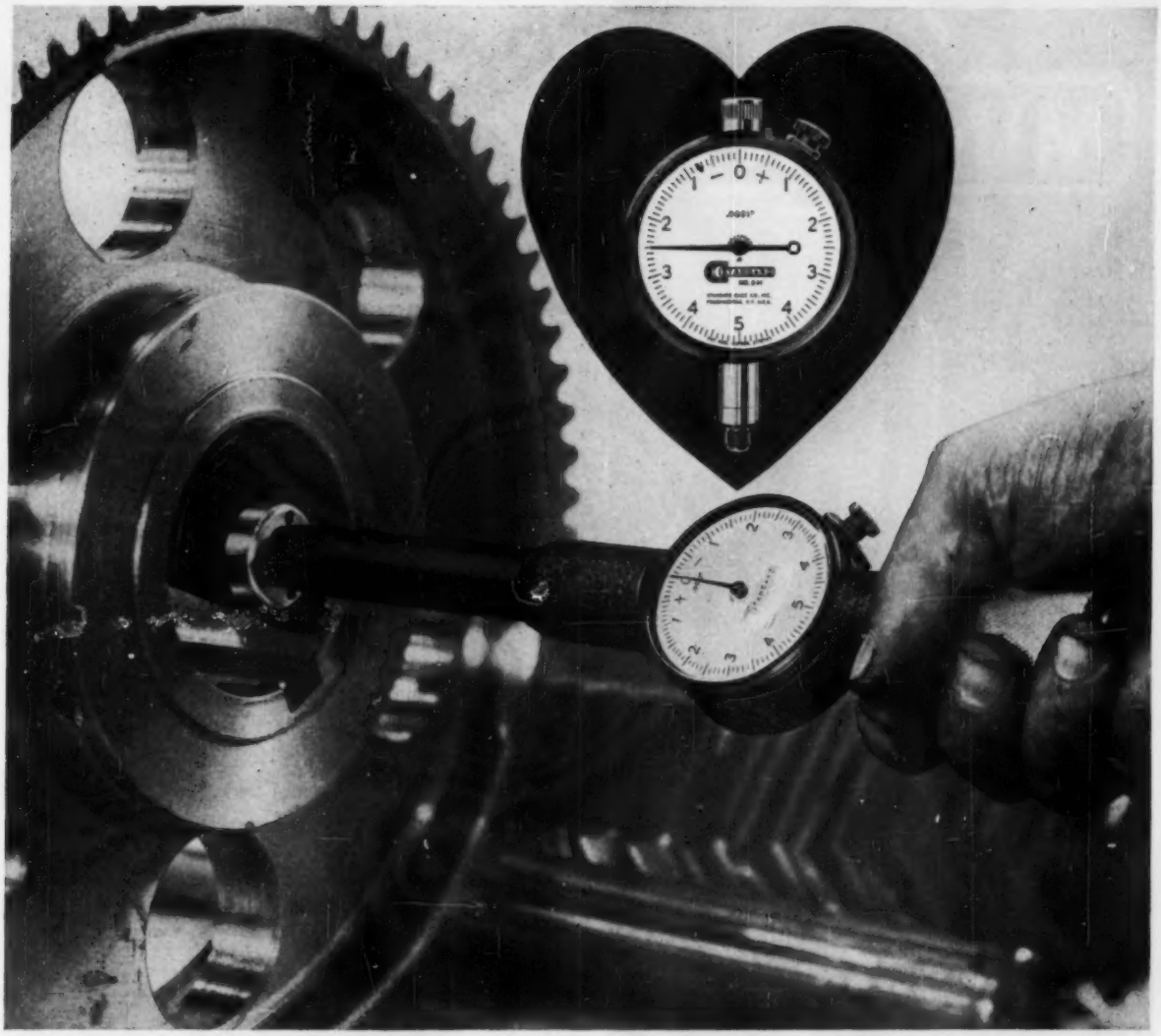

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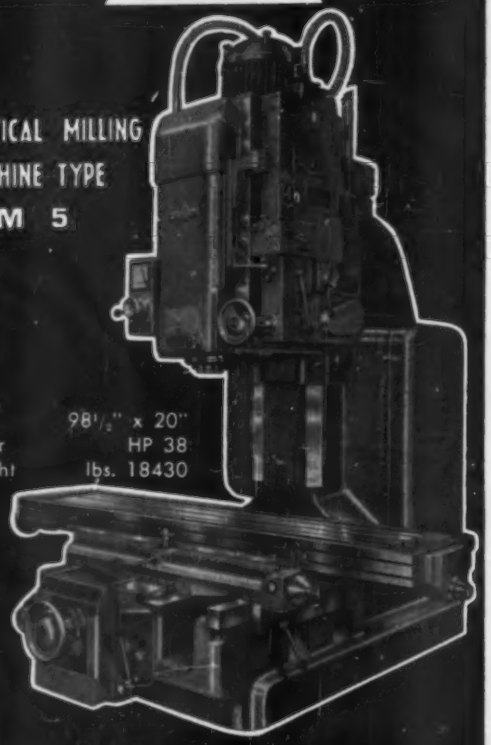

VERTICAL MILLING
MACHINE TYPE
FVM 5

| | |
|---|---|
| Table | 98½" x 20" |
| Power | HP 38 |
| Weight | lbs. 18430 |

Ram Type Turret Lathes - Saddle Type Turret Lathes with hydraulic spindle speed preselector - Automatic Cycle Turret Lathes - Vertical Slotting Machines - Internal Grinding Machines - Precision Vertical Milling and Boring Machines - Diamond Turning Machines - Vertical Milling Machines - Keyway Automatic Milling Machines - Gear Cutting Machines - Transfer Units for Automation.

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**MODEL 50**
for 2, 3, 4 flute taps
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to 1-1/16"

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to 2-1/4"

- *low cost*
- *quick*
- *accurate*
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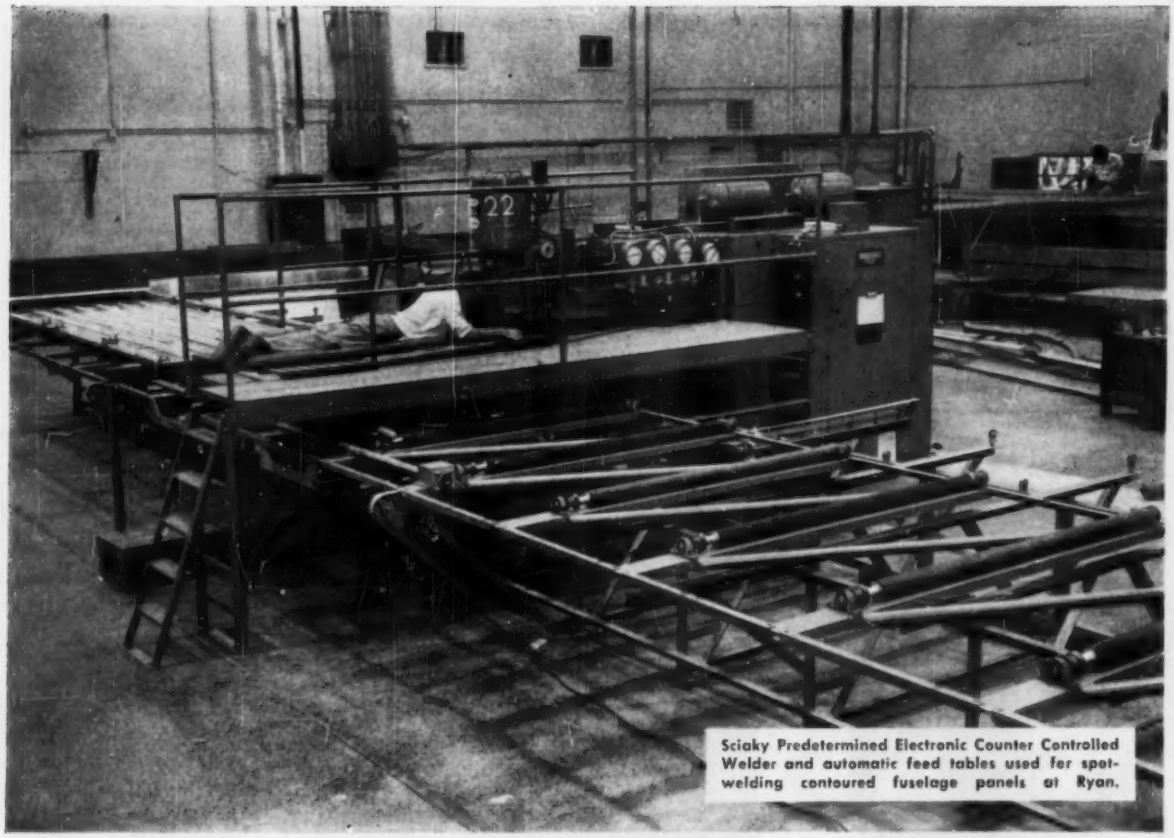


Sciaky Predetermined Electronic Counter Controlled Welder and automatic feed tables used for spot-welding contoured fuselage panels at Ryan.

# COMPLEX SPOTWELDING PROGRAM AT RYAN IS SEVERE TEST FOR NEW SCIAKY COUNTER CONTROL

Ryan Aeronautical Company, San Diego, California has achieved a significant first in resistance welding—automatic spot welding of large contoured fuselage panels for the Boeing KC-135 and "707" Jets.

Referring to their new Sciaky Counter Controlled Welder, Mr. Bob Fullerton, Ryan's Senior Welding Engineer, stated, *"This is one new welding development that really does what the advance announcements promised."*

### PRECISE CONTROL

Early in the program, it became obvious that precise control of all welder functions and absolute production consistency of welding was essential. Introduction of the new Predetermined Electronic Counter Controlled Welder by Sciaky helped solve this problem.

Here, for the first time, is a welder in which functions are controlled to a fraction of a cycle of alternating current. Control settings are realized with exactness. The unvarying accuracy of counting is maintained throughout the entire range for the longest run at the highest production rate. Any production control setting is readily reproducible at any time.

### CONSISTENT, SAFE WELDS

The consistently safe welds produced by the Sciaky Counter Weld Control are essential to the Ryan program since the skin is a load-bearing member. In addition, the size of the assembly—largest every sub-contracted in the industry—will not tolerate even the possibility of rejects due to imperfect welds.

The importance of consistently perfect welds is emphasized by the tremendous number of spotwelds in the aft fuselage sections of the Boeing jet tanker-transports. Approximately 77,000 spot welds are required to join skins to skins, skins to doublers and stringers, and bulkhead components together.

### TAPE COMMAND OF WELDING OPERATIONS

Welding operations on the various assemblies can be controlled by a tape command unit providing complete piece part positioning in all directions. Automatic interlock between positioner and welder is required. This would provide more automatic operation.

### COMPLEX TOOL-UP

Handling and positioning the aluminum skins also presented a major problem. Ryan solved this by installing huge positioning tables with push button contro's to permit automatic feeding.

The characteristics and consistent operation of the Sciaky Counter Controlled Welder combine perfectly with the automatic abilities and consistency of the Ryan positioning table to satisfy the requirements of this complex production assembling operation.

### LITERATURE AVAILABLE

Technical bulletins completely describing the new Sciaky Predetermined Electronic Counter Weld Control are available. Write on your company letterhead requesting Bulletins 338 and 339.

**SCIAKY.** *Helps Put Profit Into Manufacturing*

**Sciaky Bros., Inc., 4933 West 67th St., Chicago 38, Ill., Portsmouth 7-5600**

# Clean and Sterilize Cutting Oil Automatically

**with the NEW**

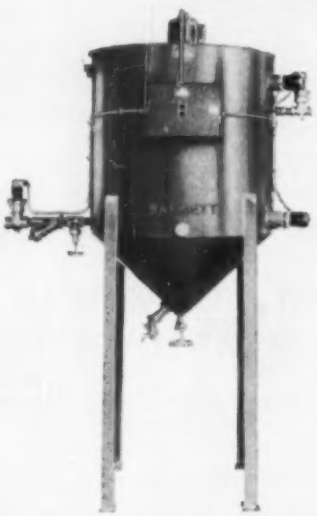
## BARRETT STERILIZER AND SEDIMENT PRECIPITATOR

**—INCREASES TOOL LIFE AND ASSURES BETTER FINISHES**

When the oil viscosity is lowered during heating even the smallest suspended particles settle out.

**—KILLS HARMFUL BACTERIA**

Eliminates the basic cause of skin infections from used cutting oil.



**INCLUDES THESE FEATURES**

1. Completely automatic cycle.
2. Uniform heating by motorized oil circulation.
3. Adjustable thermostatic control.
4. Controlled settling time.
5. Easy access for periodic cleaning.

**THE LEON J. BARRETT CO.**

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are accurate, reliable and built to stand hard usage.

Model "C 50 B" has a 2½" overall diameter, balanced dial 0-25-0 with .0005" graduations, ½" range and movable dial easily set at zero.

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# Cut die design work in HALF on many jobs!

***Save time with these hundreds of successful designs for cold pressworking***

This practical guide not only shows how to make *better, more efficient* designs, but also presents hundreds of *actual, proven* die designs for cold press-working of sheet or strip metal. Representing best practice of many ASTE members, these designs can save you more than 50% work and time on many jobs. You will find them *easy* to adapt to your own needs. The Handbook provides a wealth of data on such subjects as design of stampings, die sets and components, press feeding and unloading equipment, die and stamping materials, etc.

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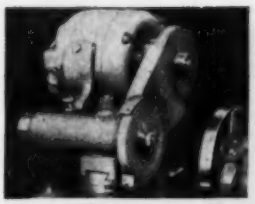


External Grinder

Milling Attachment

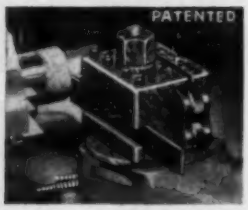
Handlever Tailstock

Handlever Bed Turret

Telescopic Taper Attachment

Handwheel Collet Attachment

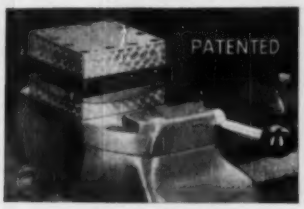
Handlever Collet Attachment



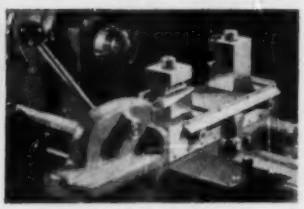

10 in 1 Tool Holder

Ball Bearing Live Center

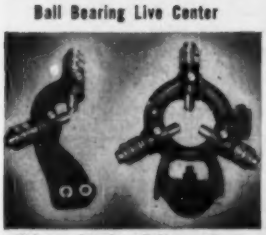
Adjustable Collet Bushing Chuck




Square Turret Tool Block

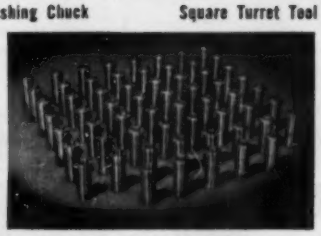


Handlever Double Tool Cross Slide

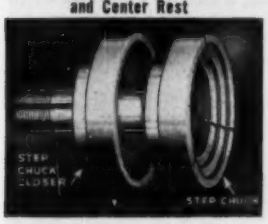


Telescoping Jaw Follower Rest and Center Rest

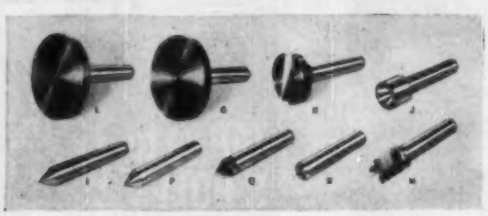
Collet Rack



Steel and Brass Collets

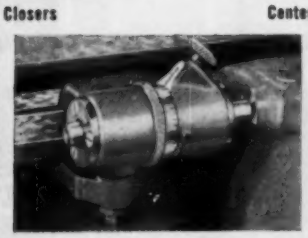



Step Chucks and Closers



Centers and Drill Pads

Thread Indicator



Micrometer Carriage Stop

Four Position Carriage Stop


# SOUTH BEND

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*— Cut Production Time*
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*— Speed Up Tooling*
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*— Reduce Operator Fatigue*

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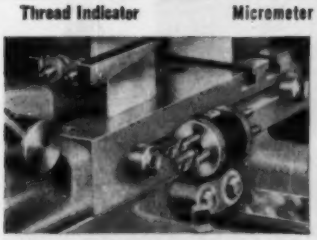
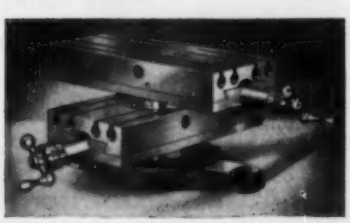
**SOUTH BEND LATHE**
SOUTH BEND 22,
INDIANA

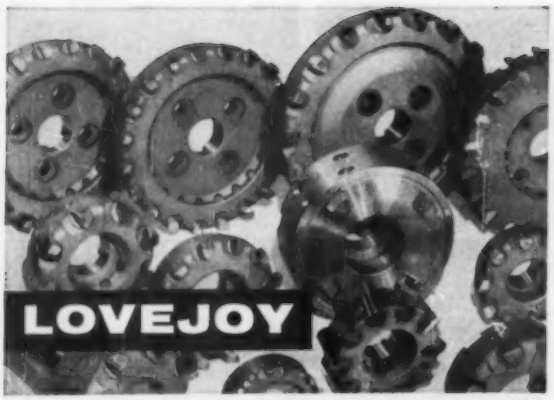
Four Position Cross Slide Stop

Dial Indicator Carriage Stop

Coolant Pump



Universal Table

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- Unique blade, shoe and wedge positive-locking principle assures perfect alignment, enormous strength and versatility.
- Offer tooth spacing and blade capacity for all conditions.
- Exclusive body design permits use of correct blade for each job and every material.
- HSS and carbide blades available with lead angles up to and including 45°.

*Write for Catalog No. 31*

**LOVEJOY TOOL COMPANY, INC.**
141 Main Street, Springfield, Vermont, U.S.A.

# KEYSEATING
## The Modern Way

Illustration shows typical set-up for cutting taper keyways with table tilted.

Machines are made in three sizes for keyways 1/16" to 1" in width.

Great simplicity and ease of operation of Davis Keyseater, assure the user of accurate, time saving work.
*Let our engineer study your keyseating problems.*

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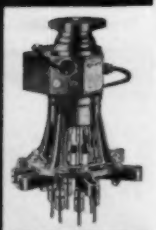

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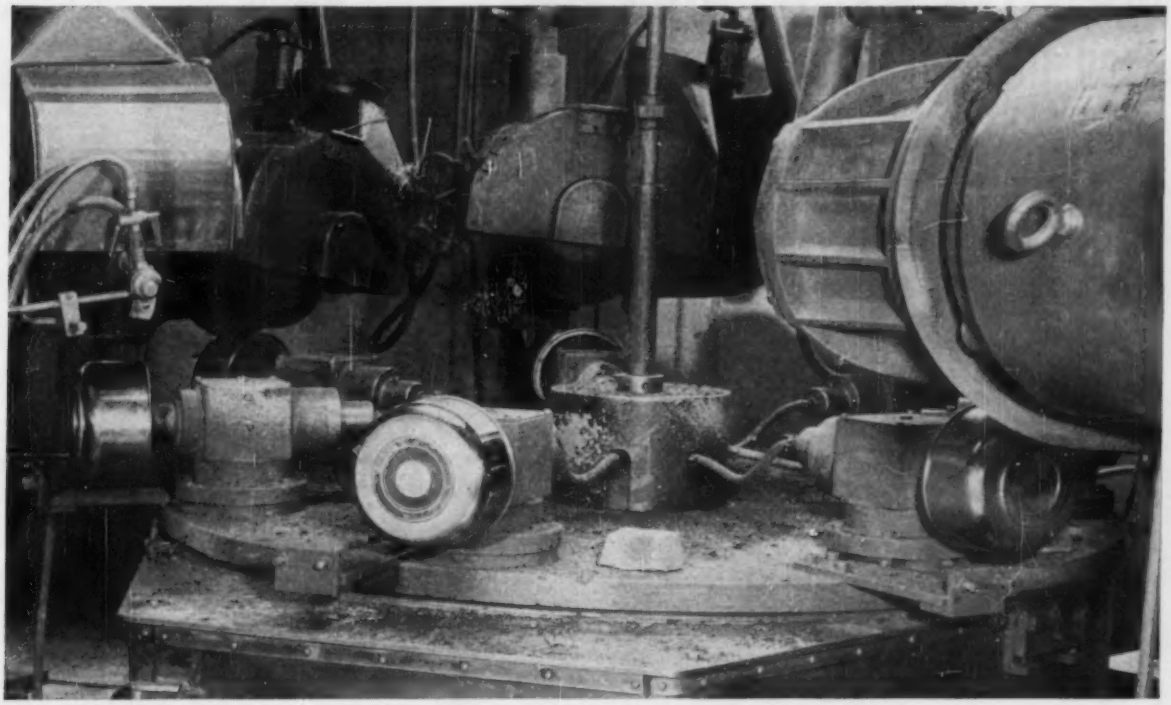

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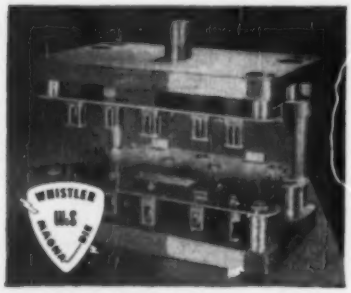
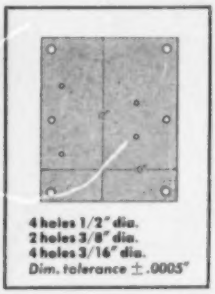
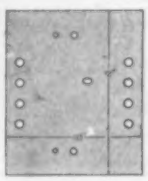


4 holes 1/2" dia.
2 holes 3/8" dia.
4 holes 3/16" dia.
*Dim. tolerance ± .0005"*

**$106 SAVED ON JOB NO. 1...EVEN INITIAL INVESTMENT IS LESS**
This Whistler Magna-Die unit includes a 12" x 14" die set, 10 punch and 10 die retainers, 10 punches, 10 die bushings, 10 strippers, 3 gages and one set of templets. The complete price with templets jig bored and gages mounted for producing the 10-hole part shown above: $819.00. The approximate cost of a custom die to do the same job: $925.00. From the very start, you start to save with a Whistler Magna-Die.



8 holes 1/2" dia.
2 holes 3/8" dia.
2 holes 3/16" dia.
1 oval hole 3/8" x 1/2"
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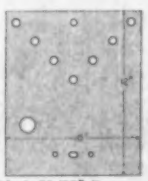
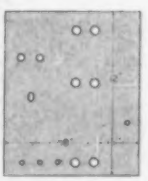
**$710 SAVED ON JOB NO. 2.** All of the original punch and die parts (with the exception of 2 punches, 2 bushings and 2 strippers) are re-used here. The additional tooling required, plus bored templets with gages mounted, cost $389.79. The approximate cost of a custom die to produce this part: $1100. *Savings pile up with each succeeding job...$916 so far.*



1 hole 31/32" dia.
7 holes 1/2" dia.
1 hole 3/8" dia.
2 holes 3/16" dia.
1 oval hole 3/8" x 1/2"
*Dim. tolerance ± .0005"*

**$793 SAVED ON JOB NO. 3.** Through the use of another punch and die retainer unit, a 31/32" punch, die bushing and stripper plus a new set of bored templets with gages, this part is produced at a die cost of $246.81. In this case, the cost of a custom die would amount to approximately $1040.00. *Savings now reach $1609.*



6 holes 1/2" dia.
2 holes 3/8" dia.
4 holes 3/16" dia.
1 oval hole 3/8" x 1/2"
*Dim. tolerance ± .0005"*

**$925 SAVED ON JOB NO. 4.** As more Whistler punch and die parts are accumulated, die costs for each succeeding job usually go down even further. Here, for example, only a new set of templets, jig bored to the 13-hole pattern, is needed. The cost: $163.55. A custom die for this job would run approximately $1089.00. Total savings for these first four jobs alone amount to approx. $2535.

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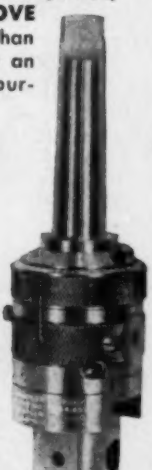

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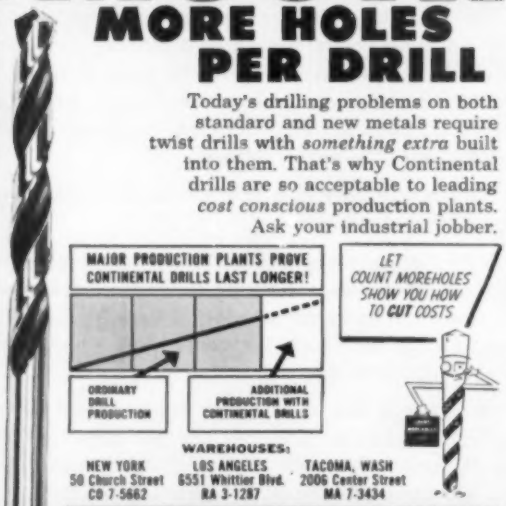
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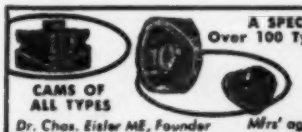

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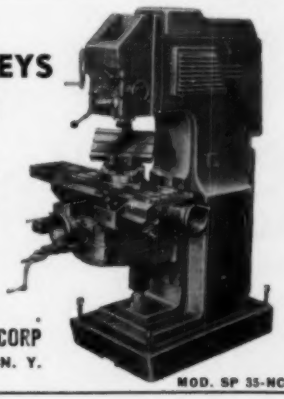

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## THE SURPLUS MACHINERY MARKET

•**Of primary interest to any shop owner** who today is weighing the pros and cons of "Should I buy a new machine tool?" or "Should I have my present one rebuilt?" is an article on "How a Machine Tool Is Rebuilt" that will appear in the *American Machinist* 1958 Production Planbook and Buyers' Guide, out this month.

**Robert Bierbaum, president of Eastern Machinery Co,** Cincinnati, reputedly the world's largest rebuilder of machine tools, will outline the steps that Eastern goes through to produce a machine tool that is "equal to or better than it was when it was new."

•**We've been plugging away at Defense Dept Officials** in Washington, trying to get more information about the government's step-up in sales of surplus machine tools. As reported in the last issue on the Machine Tools page, as many as 18,000 surplus government machine tools may go on the block in the period 1955-1959.

**If handled badly,** and there are rumors that one service, particularly, has been all for unloading the machines as fast as possible, the wholesale dumping of machines could have a very bad effect on both the new and used machine tool market. This would be especially true if the Armed Services go through with a proposed plan to trade in old machines on new ones. That would mean that machines a lot younger and in a lot better condition than we've been acustomed to finding at government surplus sales would be loaded indirectly onto the market by the government. But we have the assurance of a high Defense Dept official that there'll be no wholesale dumping of surplus machine tools into the market by the Services. The Defense Dept, he says, has no intention of upsetting the industry applecart.

•**Let's once again take highly industrialized Ohio,** with its widely varied metalworking operations, as generally indicative of market conditions throughout the country.

**In Cleveland, for instance, business is pretty slow,** with no signs of a pickup as yet. As one dealer puts it, "Our inquiries all seem to be from people who ordinarily would be buying new machinery. Now they are checking through the old stuff, and usually they wind up buying nothing."

**This dealer reports that his inventories are up about 30%** over last year's, and that there's very little movement. The sales manager attributes this to the continued tightness of money, and to a general uncertainty on the part of metalworking as to business conditions in the near future. "Looks like industry has lost some of the confidence that bolstered it last year." Another dealer claims there's some activity in the market. But, he says, "it's all activity we're making ourselves. There's very little business comes knocking at the door."

**But new MDNA President Elmer W Pfeil, a Clevelander,** reports that he's noticed a slight, but definite, pickup in inquiries over the last month, following the seasonal July letdown, and he looks forward to a strong fourth quarter.

**Maybe choosing Ohio as an area representative of the market** across the country isn't such a good idea after all—because there's the paradox of Cincinnati. Down there dealers report that business is "very good—we can sell all the standard tools we can lay our hands on. Trouble is, we can't lay our hands on enough."

Why the difference in outlook and business reports between the Cleveland and Cincinnati dealers? One Cincinnati dealer's analysis—"It's price. We've abandoned the old theory of buying for 5 and selling for 15, because buyers are shopping around and making comparisons much more than they did a couple of years back. There's a lot of resistance to unrealistic pricing nowadays."

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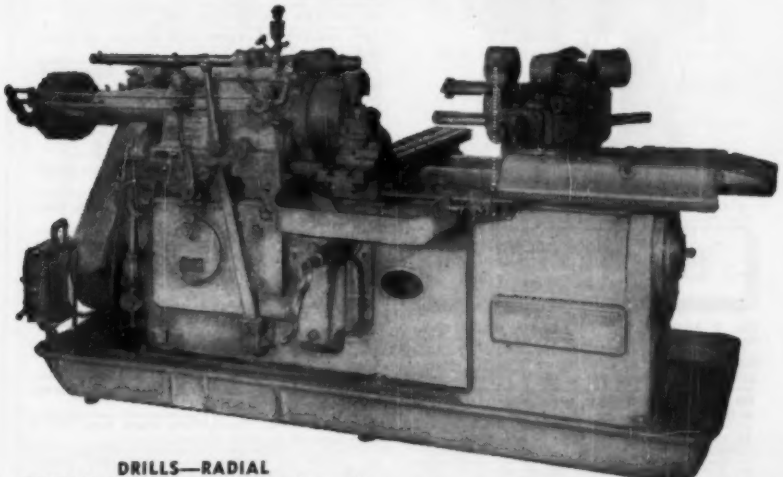

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**GEAR EQUIPMENT—FELLOWS**

FELLOWS 3"; fine pitch; late type.
FELLOWS Type 645-A-3; high speed; late type.
FELLOWS 61A; high speed; late type.
FELLOWS 624; high speed; late type.
FELLOWS #7; high speed; late type.
FELLOWS #72; high speed; late type.
FELLOWS #712; high speed; late type.
FELLOWS #725A; high speed; late type.
FELLOWS #715A; high speed; late type.
FELLOWS #7125; high speed; late type.
FELLOWS 6Z2; high speed; late type.

**GRINDERS—UNIVERSAL**

BROWN & SHARPE #1, 10"x20" centers; late type.
BROWN & SHARPE #2, 14"x30" centers; Machine new 1954—NEVER USED.
BROWN & SHARPE #3, 14"x40" centers; late type.
BROWN & SHARPE #4, 14"x60" centers; late type.
CINCINNATI 16"x72" centers, Model ER; late type.
LANDIS 14"x36" centers, Type C; late type.
LANDIS 16"x36" centers, Type C; late type.

**GRINDERS—PLAIN CYLINDRICAL**

BROWN & SHARPE 10"x36" centers, Model 22; late type.
CINCINNATI 4"x12" centers; Type H; late type.
LANDIS 6"x18" centers; Type C; late type.
LANDIS 10"x36" centers; D.C.; late type.
LANDIS 10"x72" centers; D.C.; late type.
LANDIS 10"x96" centers; Type C; late type.
LANDIS 16"x120" centers; Type 20; late type.
LANDIS 25"x72" centers; Type D; CRANKPIN; late type.
LEMPCO 22"x84" centers; Model KGC, CRANKSHAFT; late type.
NORTON 6"x30" centers, Type C; late type.
NORTON 6x18" centers, Type C; late type.
NORTON 10"x18" centers, Type C; late type.
NORTON 14"x72" centers, Type C; late type.
NORTON 16"x48" centers, Type C; late type.
NORTON 18"x72" centers, Type C. CRANKSHAFT REGRINDER; late.
VAN NORMAN Model 418—New 1954—NEVER USED.

**LATHES—ENGINE**

DENHAM 18/36"x48" centers; late type.
DIMCO 16"x40" centers; late type.
HENDEY 14"x102" centers; late type.
HENDEY 16/24"x30" centers; late type.
HENDEY 16"x54" centers; late type.
LEBLOND 16"x102" centers; late type.
LEBLOND 18"x78" centers; late type.
LEBLOND 24"x84" centers "REGAL"; late type.
LEBLOND 24"x96" centers "REGAL"; late type.
LEBLOND 30"x60" centers; heavy duty; motor drive.
LODGE & SHIPLEY 14"x30" centers; late type.
MONARCH 10"x20" centers Model EE; late type.
MONARCH 12"x30" centers, Model CKK; late type.
MONARCH 16"x30" centers, Model CY; late type.
MONARCH 18"x72" centers, Model CBB; late type.
NILES BEMENT POND 120"x96' centers; Heavy Duty; 2 carriage motor drive.
PRATT & WHITNEY 16"x30" centers; Model C; late type.

**LATHES—TURRET**

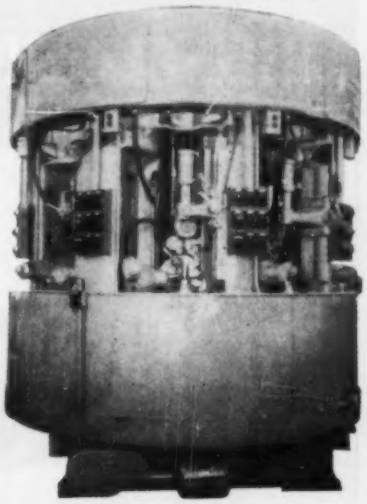
GISHOLT #1L Univ., Saddle Type; late type.
GISHOLT #2L Univ., Saddle Type; late type.
GISHOLT #3 Ram Type Chucking; late type.
GISHOLT #4 Pre-selector; Ram Type Chucking; late type.
GISHOLT #5 Pre-selector Bar or Chuck; late type.
LIBBY #LH-12 Saddle Type; 12 holes; late type.
MOREY #3 Ram Type; Bar & Chucking; New 1954
POTTER & JOHNSTON #4D Chucking; late type.
WARNER & SWASEY #1 "ELECTRIC"; late type.
WARNER & SWASEY #1A Univ., Saddle Type Chucking; late type.
WARNER & SWASEY #2A Univ., Saddle Type Chucking; late type.
WARNER & SWASEY #3A Univ., Saddle Type Chucking; late type.

**LATHES—MANUFACTURING**

GISHOLT #12 Automatic; late type.
H.E.B. 17"x40" centers; Tracer—new 1955.
JONES & LAMSON "FAY" 8"x15" centers; late type.
JONES & LAMSON 20"x25" centers; late type.
LEBLOND 9"x30" centers; Model 7AC CRANKSHAFT; motor drive.
LEBLOND 42"x26' Single end Boring.
LIPE "CARBO" 12"x18" centers; late type.
MONARCH 14"x42" centers, Model Z; Magnamatic; late type.
PRATT & WHITNEY #1—½Bx61", 2 spindle Deep Hole; late type.
PRATT & WHITNEY #1—½Bx102", 2 spindle Deep Hole; late type
SUNDSTRAND 12"x22"; late type.

**MILLING MACHINES—PLAIN, HORIZONTAL**

CINCINNATI 0-8 Auto. rise and fall; late type.
CINCINNATI 2-24 Auto. rise and fall, late type.
CINCINNATI 3-24 "HYDROMATIC"; late type.
CINCINNATI #3 High Speed Dial; late type
CINCINNATI 5-48 "HYDROMATIC"; hydraulic tracing head; late type.
CINCINNATI 45-60 "DUPLEX", Hydromatic; late type.
KEARNEY & TRECKER #2H high speed; late type.
U.S. Model MJ 1-6 Multi-Miller; late type.



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24", 36" BULLARD Vertical Turret Lathe, Turret Hd., Side Hd., M.D.

No. 2, 3, 4, 6 WARNER & SWASEY Univ. Turret Lathes, Bar Feed.

No. 7 BARDONS & OLIVER Universal Turret Lathes, Preselector. Bar & Chucking, Late.

No. 1L, 2L, 3L GISHOLT Univ. Turret Lathe, Cross Sliding Turret, M.D.

## DRILLING MACHINES

28" BARNES Upright Drill Press No. 242 M.D. Box Column, Power Feed.

3', 5', 6' CINCINNATI-BICKFORD Radial.

## MILLS

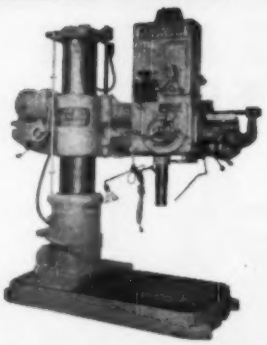
No. 3 Cincinnati HSDT Vertical Mill 1944

No. 56-90 CINCINNATI Duplex Hydromatic Mill, Late Type.

No. 0-8 CINCINNATI Horizontal & Vertical Prod. Mills, M.D.

No. 34-36, 46-48, 48" Cincinnati Duplex Mills. Late Type.

No. 2HL KEARNEY & TRECKER Horiz. Mill, M.D., Late Type.



3'x13" Cal. CINCI-BICKFORD "Super Service" Radial Drill. Motor on Arm.

No. 2 BROWN & SHARPE Vert. Mill, Light Type. Swivel Head, M.D. Late.

No. 2, No. 3, 4 CINCINNATI HSDT Horiz. Mills, Vert. Heads Extra Table Travel, 1945.

No. 1-14 KENT-OWENS Hydraulic Prod. Mills M.D., Late Type.

10'x3/16" Cinc. 18" Gap Power Shear, Late Type.

8'x1/4" Niagara Power Shear, M.D.

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No. 6 BLISS Straight Side Press Double Crank 135 Tons Cap., Motor Drives.

3W WATERBURY FARREL Hi-Speed Blanking, 60 Tons Cap., 1½" Stroke, Reeves Drive.

No. 18, 19, 20, 21 Bliss O.B.I. Press.

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28" x 12' centers, FARREL Traveling Table Type Roll Grinder, New in 1942. Excellent condition.

6" x 18" NORTON Hydraulic Horizontal Surface Grinder, Permanent Magnetic Chuck, Coolant System, Late Type.

6" x 10" x 48" NORTON Hyd. Horiz. Surf. Grinder, M.D.

4T SELLERS Tool Grinder, MD, Late Type.

30" INGERSOLL Face Mill Cutter Grinder, M.D. Late Type.

6" x 18" LANDIS Type "C" M.D. Hyd., Cylindrical Grinder, Serial #29196.

No. 5 BROWN & SHARPE Hyd. Surface Grinder 8" x 24"

## MISCELLANEOUS

18 KW SCIENTIFIC ELECTRIC Induction Heater, Tube Type.

No. 13 BROWN & SHARPE Univ. Tool & Cutter Grinder, Late Type.

No. 175 SCHMIDT M.D. Hyd. Power Marking Machine, Late Type.

No. 3, 5 MITTS & MERRILL, No. 5 Davis Keyseaters, M.D.

No. 194 BARNES Vertical Hone, 4" Capacity, 12" Stroke, M.D.

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8" CLEVELAND Model A Automatic Screw Machine. Late Type.

No. 9 MARVEL Heavy-Duty Hack Saw 10" x 10' Cap. M.D. Late Type.

6' x 10 ga. Parker Power Squaring Shear, M.D. Late Type.

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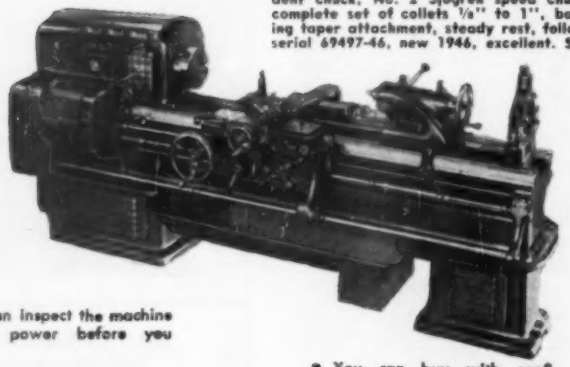

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No. 12 Gleason Straight Tooth Bevel Gear Rougher, & Finisher, m.d.
No. 36 Gould & Eberhardt Bevel & Spur Gear Rougher, m.d.
No. 36N Gould & Eberhardt Spur Gear Cutter
No. 60BM Gould & Eberhardt, 3 spindle Vertical Gear Cutter, Roughing & Finishing, External Spur gears only
No. 4B Fellows Gear Burnisher
No. 8B Fellows Gear Burnisher
3" Gleason Gear Generator, m.d.
8" Gleason Gear Generator, m.d.
11" Gleason Gear Generator, m.d.
No. 5AC Loss-Bradner Heavy Type Gear Generator, m.d.
No. 4—48" Brown & Sharpe Spur Gear Cutter, belt
No. 4—48" Brown & Sharpe, m.d.

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Type A Barber Colman, m.d.
No. 1 Loss-Bradner Universal, m.d.
No. 12 Barber-Colman, Double Overarm, m.d.
No. 12 Barber-Colman, Single Overarm, m.d.
No. 34 Brown & Sharpe, m.d. Spur & Spiral
No. 130 Cleveland Rigid Hobber
No. 12H Gould & Eberh. Univ. Mfg. Gear Hob m.d.
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18x88" Landis Universal Type C, m.d., late
22x72" Landis Type CH, m.d., late

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No. 2A Wm. Sellers Universal Tool Grinder, m.d.
No. 2B Sellers Wet Grinder, m.d.
No. 4T Sellers Tool, m.d., latest
No. 5T Sellers, m.d.
No. 6G Sellers, m.d.
No. 13 Gleason Cutter Sharpener, m.d., late
Ingersoll Face Mill Grinder
No. 13 Brown & Sharpe Univ. Cutter Grinder, m.d.
12" Gleason Spir. Bev. Gear Cutter Sharpener, m.d.
No. 4-4 Barber-Colman Hob Sharpener
Sundstrand Tool Grinder, m.d.
Rotorex Universal Tool & Cutter, m.d., late
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No. 182 Barnesdrill, m.d.
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H1 Micromatic Horizontal Hydrohoner, m.d.
H4 Micromatic Horizontal Hydrohoner, m.d.
No. 6 Barnes Twin Spindle
No. 326H Barnes Single Spindle
No. 224B Barnes Honing Machine, m.d.
Model MA Sunnen Bench Type, m.d.

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No. 9½ Hilles & Jones Punch & Shear, single end, type "G"
Cleveland Type G Vertical Shear, 72" thrust, m.d.

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100 ton Wood Hydraulic Press, 4 col., single action-downs
100 ton Chambersburg, Hydraulic
No. 6 Verdin, Kappes & Verdin Straight Side
No. 4 Stevenson O.B.I. Punch Press, direct geared flywheel drive
Type 5750 Hennifin Hydraulic Straightening
Model H Cleveland O.B.I. Punch Press, belt drive
No. 1 Robinson O.B.I., belt drive
No. 68B Niagara Str. Sided Sin. Geared Dbl. Crk.
No. 164½ Toledo Toggle Drawing & Deep Stamping
No. H3 Niagara Horn Press, single back gear
20 ton Oilgear Gooseneck Assembly Type Hydraulic
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7½ ton Fr. Oil Mill Mach. Co. Straight, m.d., 1942
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6x6" Peerless Hack Saw
No. 32B Cochran Bly Saw, m.d., latest
Model 401 Cutomatic Abrasive Cut-off, m.d.
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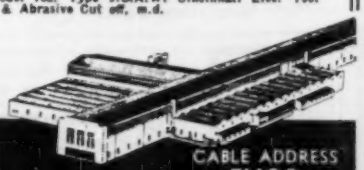
Do-All metal Cutting Band Saw, Z-V-60-28, m.d.
Model 102, Type J.C.A.W. Cincinnati Elec. Tool & Abrasive Cut off, m.d.



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Serial:—#110085
Area of Bed:—49" RL, 48" FB
Maximum Stroke:—15"
Daylight:—35"
Press Speed Inches Per Minute
Quick Advance 395", Pressing 13", Return 320"
Working Pressure:—2650# Per Sq. Inch
Bolster:—7½" Thick
Northern Pump:—#5630—Capacity:—66 GPM
60 HP, 685 R.P.M. Main Motor, 3 HP, 1150 R.P.M. Auxiliary
Motor with Double Shaft Extension, 440 Volt, 3 Phase, 60 Cycle
Overall Height:—22'3"

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Daylight:—42"
Cushion:—166 Tons
325 Gallon Reservoir
100 H.P. Westinghouse Motor 220/440, 3 Phase, 60 Cycle

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Area of Bed:—44" RL x 38" FB
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Strokes Per Minute:—Up to 35
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Weight:—35 Ton

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Model:—#306
Serial:—#7685
Area of Bed:—25" RL x 26" FB
Bolster:—3" Thick
Stroke:—9¾"
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Push Button Station

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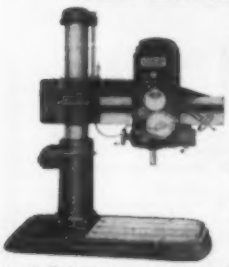

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TOCCO 200 KW, 5,000 cy. 1943
TOCCO 80 KW, 10,000 cy. 1943
GISHOLT #3 Air Chuck & Cyl. 1943
WARNER & SWASEY 2A Bar Feed 1946
5" AJAX Air Clutch Upsetter, 1947
CINCINNATI 5-54 duplex broach, 1948
LAPOINTE, Vert. Broach 28T, 90" st. 1941
CINN. Cyl Grinder 6x18 Plunge 1945
CINN. Cyl. Grinder, 10x18 Plunge 1941
CINN. Cyl. Grinder, 16x72 Plunge 1945
CINCINNATI 1066 horizontal 2-way, 1946
EXCELLO #33 Thread Grinder 1942
NORTON Cyl. Grinder, 6x18 Plunge 1944
HANCHETT #900 Face Grinder 1944
ROCKFORD Hyd. Vert. Shaper, 12" st. 1944
GRAY DH Planer, 96x96x12, 4 heads, DC drive
BETTS DH Planer, 84x84x18, 4 heads, DC drive
SUMMER & ADAMS Thread Mill, 18", H.I.S. 1943
BIGNALL & KEELER 6" pipe threader, 1948
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BIRDSBORO hydraulic straightening press, 600 ton, 66x72 bed, 18" stroke, 36" daylight (3) 1942

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Warco, cap. 600 tons, bed 180"x84". Double Roll feed. Uncoiler, straightener.
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Niagara No. 616, cap. 100 ton, Bed 72"x42".
Bliss No. 59½-48W, cap. 120 ton, Bed 48"x36".
Bliss-Toledo No. 95½-J, cap. 140 tons, Bed 108"x 48".
Bliss 93½ H, Bed 84"x36", cap. 140 tons.
Niagara—B6½-72, gap frame bed 72"x28", 8" stroke, air clutch.
Cleveland No. 65D96, cap. 150 ton, Bed 96"x48" str. 8".
Bliss #8½—60, 100 tons, bed 80"x30".
Bliss #59½—60, cap. 125 tons, bed 80"x54".
*Machines have Air Clutch and some have Air Cushion and Motor Driven Ram Adjustment.*
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**THREAD GRINDER**

TG636 J & L Serial 110793. Excellent condition — relieving attachment — abundance of tooling and accessories—two wheel dresser heads — Universal and Pantograph. Price: $15,000.00.

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New Britain Model 18 Auto. Chucker 6-Sp.
Brown & Sharpe No. 2 Surf. Grinder All Motorized
G.A.L. 3" Bar Table Type Horiz. Boring Mill
Colburn 2-Spindle Box Col. Heavy Drill M.D. 30"
Niles (Timesaver Model) 32"x14' Bed Grd. Hd. M.D. Lathe 7" Centers.
Niagara 4' Power Shear ½" Cap. 20" Gap
Ohio 24" M.D. All Grd. Feeds Shaper 1942 model
Cincinnati No. 5 Rect. Overarm Grd. Hd. Plain Horiz. Miller.
Baush 44" Vert. Boring Mill 2 heads.
American Vert. Hyd. Broach 48" str. 15 ton cap. 1947
American 26"x8' Grd. Hd. Lathe motor in base.
Landis 20"x72" and 10"x20" Plain st. Grinder.
Hanchett 25 H.P. Sp. Vert. Hydr. Surf. Grinder 12"x48" table
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Bliss 200 T Cap. S.S.S.C.B. Grd Press 8" Str. #77
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GRINDERS, No. 58 Hanchett Vert. Rotary, 44
30" x 42" P. & W. Vert. Surf., '47
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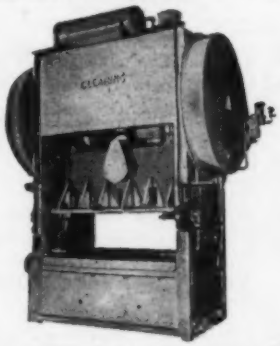

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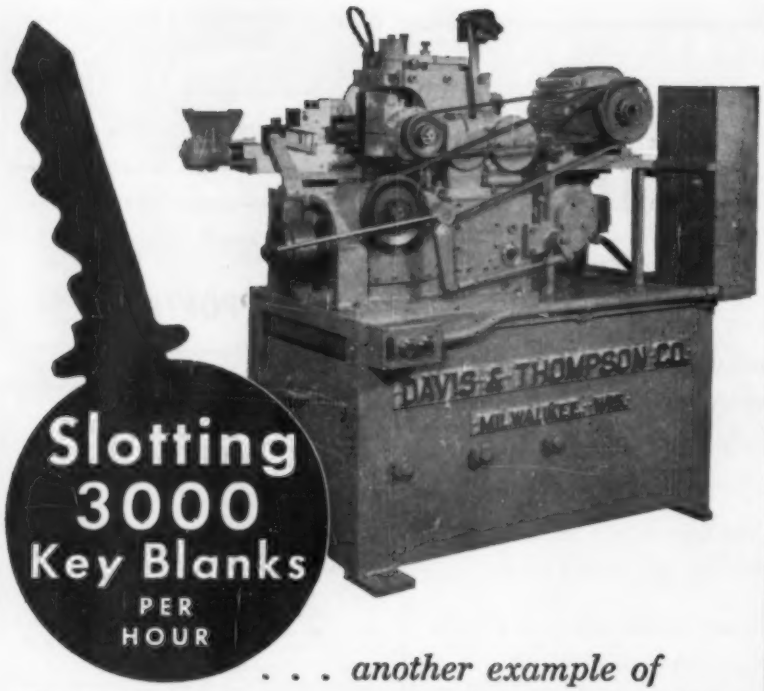


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## Index of PRODUCTS ADVERTISED In This Issue


Abrasives, Coated ..... 234, 331
Abrasives, (Not Bonded) ... Insert Facing 64
Accessories & Attachments (Machine Tool) ..... 228-229, 300, 326, 329, 351

Bearings ..... 4th Cover, 226, 288
Bending Machines ..... 219, 298
Books, Technical ..... 330, 335
Boring, Drilling & Milling Machines (Horizontal) ..... 28-29, 41, 310
Boring Machines Internal ... 2nd Cover, 38, 58-59, 102, 195, 259
Boring & Turning Machines (Vertical) 14-15, Insert Facing 188, Insert Facing 268, 313
Broaching Machines ..... 26-27, 212

Cams ..... 334
Chucks ... 42-43, 83, 193, 209, 260, 266, 302, 329
Cleaning & Drying Machines & Supplies ..... 263
Collets ..... 193, 329
Controls, Electrical ... Insert Bet. 32A-32D, 78-79, 214-215, 241, 289, 293, 322
Counters ..... 32
Coolant Systems, Filters & Supplies 227, 329
Cut-Off Machines ..... 54-55, 219, 352
Cutters, Abrasive ..... 246, 344

Diamond Wheels ..... 246
Die Sets ..... 100, 265, 273
Drafting Room Equipment & Supplies 332
Dressers ..... 18-19
Drilling Machines ... 41, 48, 50-51, 210-211, 244-245, 267, Insert Facing 268, 281, 283, 322
Drill Jig Bushings ..... 282, 342
Duplicators & Pantographs ... Insert Bet. 68-69, 82
Dust Collectors ..... 320

Electrical Parts & Equipment ... 168, 322
Engineering & Production Services ... 290

Fasteners ..... 62-63, 233, 279
Files, Hand ..... 66-67, 188B, 203

Index of

## PRODUCTS ADVERTISED

In This Issue

•


Gages, Instruments & Testing Equipment ... 35, 44, 85, 197, 205, 220-221, 242. 262, 268, 280, 320, 325, 328, 329, 344

Gear Cutting Machines ... 3, 6-7, 333

Gears, Speed Reducers, Motor Reducers ... 248, 253, 278, 302, 349

Gear Testers ... 3, 6-7

Grinders—Cutter & Tool ... 12-13, 47, 250-251, 326, 351

Grinding Machines—Production ... 8-9, 12-13, 16-17, 21, 39, 86, 199, 230-231. 306, 311, 315

Grinding Wheels ... 18-19, 49, 234, 304, 331

Heads: Drilling, Grinding & Tapping 46, 193, 300, 321, 332

Hydraulic & Pneumatic Parts & Equipment ... 113, 204B, 284, 330

Jig Borers ... 36, 216, 267, 278, 334

Jigs & Fixtures ... 290, 321

Keyseaters ... 264, 324, 330, 347

Lathes, Automatic ... 64, 73

Lathes, Engines ... 32A, 34, 37, 41, 52, Insert Bet. 68-69, 88-89, 92-93, 95, 207. 247, 295

Lathes, Turret ... 22-23, 41, 64, 73, 74, 191

Lubricants, Cutting Fluids, Quenching Oils & Solvents ... 56-57, 75, 98-99, 110. 222-223, 274-275, 297

Lubricating Systems & Equipment ... 317

Marking Machines, Tools, & Supplies 96

Materials, Cutting & Forming ... 24-25, 53, 189, 294, 312

Materials of Manufacture ... 20, 45, 72, 80, 114, 170, 172, 189, 226, 249, 258, 276-277, 285, 301, 314, 323

Materials Handling Equipment ... 40, 322

Millers, Die Sinkers, Profilers ... 4-5, 8-9, 218-219, 228-229, 300, 305, 326

Motors, Electrical ... 60-61, 108, 214-215, 291, 299

Oil Purifiers ... 328

Polishing & Buffing Machines & Supplies ... 254, 346


*(Continued on page 344)*

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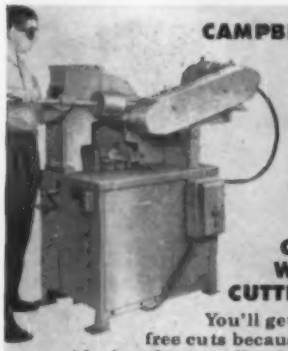

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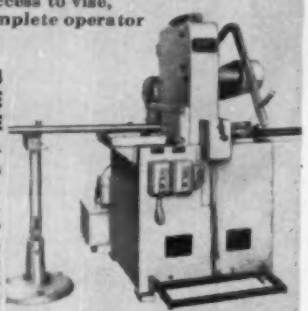

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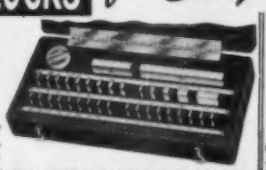

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## Index of PRODUCTS ADVERTISED

### In This Issue

•

(*Continued from page* 343)

Power Transmission ..... 270-271, 291, 348
Power Units ..... 284
Presses, Forging & Forming Equipment & Supplies ... 32D, 54-55, 65, 70-71, 106, 116, 165, 166, 208, 236, 238-239, 261, 264, 269, 280, 290, 316, 319, 332, 334, 348, 350
Pumps, Circulating ..... 266

Riveting Machines ..... 345
Rust Preventives ..... 282

Saw Blades ... 66-67, 68, 69, 232, 243, 287, 296, 302, 343
Sawing Machines ..... 68, 243, 255, 324
Screw Machines; Chucking Machines 33, Insert Bet. 68-69, 81, 87, 240, 256-257, 303
Shapers & Slotters ..... 116, 342
Shop Furniture ..... 332
Special Machine Tools ... 30-31, 76-77, 217, 218-219, 235, 272, 290
Stampings ..... 213
Steel Blue ..... 302
Swaging Machines ..... 237

Tapping Attachments ..... 321, 330, 347
Tapping Machines ..... 48, 330, 347
Thread Cutting Machines ..... 10-11, 326
Thread Rolling Machines & Tools 10-11, 97
Tooling Set up Equipment ..... 48, 329
Tools, Cutting ... 3rd Cover, 24-25, 84-85, 90-91, 94, 104, Insert Facing 204, 212, 220-221, 224-225, 228-229, Insert Bet. 236-237, 252, 292, 312, 330, 334, 345
Tools, Hand ..... 64B, 286
Tools, Measuring ..... 35, 268
Transportation ..... 268B
Turret Attachments, Lathe ..... 329

Universal Joints ..... 286
Used & Surplus Equipment ..... 336-341

Vibration Control & Mountings ..... 248
Vises ..... 300

Welding & Cutting Equipment & Supplies ..... 201, 307, 327
Wipers, Industrial ..... 318

# INDEX TO ADVERTISERS

*This index is published as a convenience to the readers. Every care is taken to make it accurate, but American Machinist assumes no responsibility for errors or omissions.*


| | Page |
|---|---|
| Aaron Machinery Company, Inc. | 41 |
| Abrasive Machine Tool Company | 311 |
| Accurate Bushing Company | 282 |
| Alemite | 317 |
| Allis-Chalmers Manufacturing Company | 214-215 |
| Aluminum Company of America | 276-277 |
| American Chain & Cable Company, Inc. | 40, 320, 344 |
| American Machinist | 308-309 |
| American Saw & Manufacturing Company | 232 |
| American Sip Corporation | 216 |
| American Steel & Wire Division | 45 |
| American Tool Works Company | 37 |
| Armco Steel Corporation | 114 |
| Armstrong Blum Manufacturing Company | 68 |
| Armstrong Brothers Tool Company | 64B |
| Assembly Products, Inc. | 322 |
| Baker Bros., Inc. | 235 |
| Barber-Colman Company | 90-91 |
| Bardons & Oliver Inc. | 74 |
| Barnes Drill Company | 227 |
| Barrett Company, Leon J. | 328 |
| Bath Company, Cyril | 106 |
| Bay State Abrasive Products Company | 49 |
| Bay State Tap & Die Company | 104 |
| Blake Company, Edward | 351 |
| Blanchard Machine Company | 86 |
| Bliss Company, E. W. | 269 |
| Brandes Press Company | 165 |
| Bridgeport Machines, Inc. | 300 |
| Brown & Sharpe Manufacturing Co. | 35 |
| Bryant Chucking Grinder Company | 256-257 |
| Bryant Machinery & Engineering Co. | 267 |
| Buck Tool Company | 266 |
| Buffalo Forge Company | 210-211 |
| Bullard Company | Insert Facing 188 |
| Bulldog Electric Products Company | 168 |
| Bunting Brass & Bronze Company | 226 |
| Burg Tool Manufacturing Co., Inc. | 244-245 |
| Campbell Machine Division, American Chain & Cable Company, Inc. | 344 |
| Canton Tool Company | Insert Facing 268 |
| Capewell Manufacturing Company | 287 |


*(Continued on page 346)*


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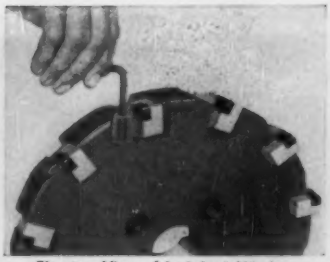

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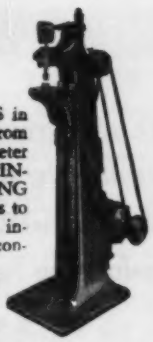

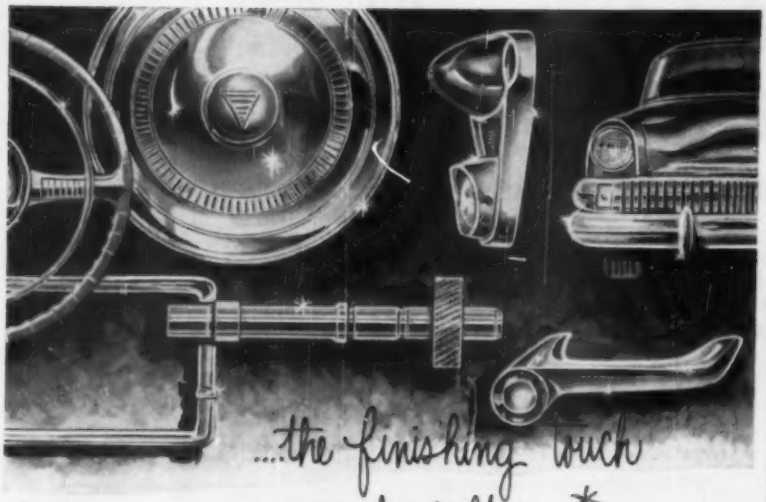


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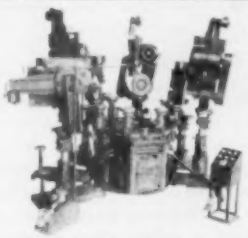

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## INDEX TO ADVERTISERS

(*Continued from page 345*)

| | Page |
|---|---|
| Carborundum Company | Insert Facing 64, 72 |
| Card Manufacturing Company, S. W. Division Union Twist Drill Company | 85 |
| Carpenter Steel Company | 285 |
| Chandler Tool Company | 332 |
| Chicago Screw Company | 188B |
| Cincinnati Gear Company | 248 |
| Cincinnati Gilbert Machine Tool Company | 259 |
| Cincinnati Grinders Incorporated | 16-17 |
| Cincinnati Lathe & Tool Company | 95 |
| Cincinnati Milling Machine Company | 4-5 |
| Cincinnati Milling Products Division Cincinnati Milling Machine Company | 75 |
| Cincinnati Shaper Company | 54-55, 116 |
| Circular Tool Company | 296 |
| Cities Service Oil Company | 297 |
| Clark, Cutler, McDermott Company | 248 |
| Clearing Machine Corporation | 261 |
| Cleereman Machine Tool Corp. | 267 |
| Cleveland Automatic Machine Company | 81 |
| Columbia-Geneva Steel Division | 45 |
| Columbia Tool Steel Co. | 53 |
| Columbus Die-Tool & Machine Company | 290 |
| Commander Mfg. Co. | 330 |
| Cone Automatic Machine Company | 87 |
| Cone Automatic Machine Company Pilot Division | 82 |
| Continental Drill Corporation | 334 |
| Copperweld Steel Company | 170 |
| Crucible Steel Company of America | 80 |
| Danly Machine Specialties Inc. | 100 |
| Davis & Thompson Company | 342 |
| Davis Keyseater Company | 330 |
| Dearborn Gage Co. | 262 |
| Delta Power Tool Division Rockwell Manufacturing Company | 283 |
| Detroit Die Set Corporation | 265 |
| Disston, Henry Division of H. K. Porter Company Inc. | 343 |
| DoAll Company | 255 |
| Dodge Manufacturing Corporation | 270-271 |
| Dreis & Krump Manufacturing Company | 208 |
| Dykem Company | 302 |
| Eastman Kodak Company, | 205 |
| Eaton Manufacturing Company Automotive Gear Division | 253 |
| Edlund Machinery Company | 281 |
| Eisler Engineering Company, Inc. | 334 |
| Ellstrom Standard Division Dearborn Gage Company | 262 |
| Erie Foundry Company | 316 |

# INDEX TO ADVERTISERS

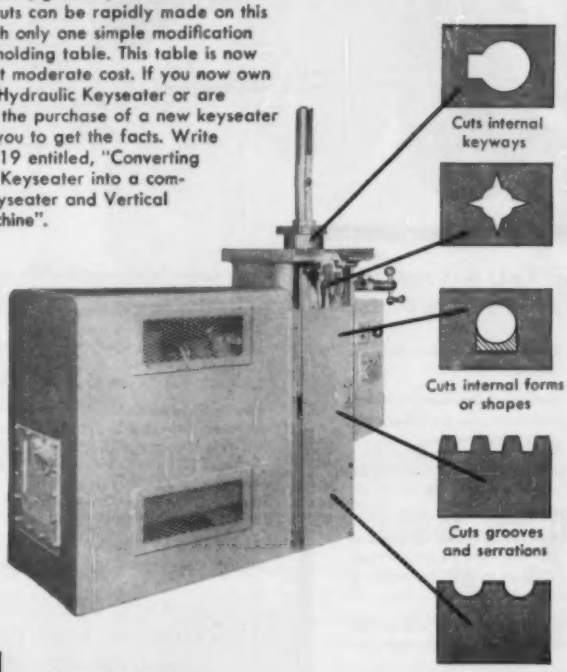

| | Page |
|---|---|
| Errington Mechanical Laboratory | 321 |
| Ex-Cell-O Corporation | 38, 102 |
| Fafnir Bearing Company | 288 |
| Fairbanks, Morse & Company | 299 |
| Famco Machine Company | 290 |
| Fellows Gear Shaper Company | 6-7 |
| Fenn Manufacturing Company | 237 |
| Forkardt K. G., Paul | 302 |
| Fosdick Machine Tool Company | 50-51 |
| Frauenthal Division; Kaydon Engineering Corp. | 230-231 |
| Galland-Henning Nopak Division | 204B |
| Gatco Rotary Bushing Company | 342 |
| General Electric Apparatus Department | Insert Bet. 32A-32D, 78-79 |
| Giddings & Lewis Machine Tool Company | 14-15 |
| Gisholt Machine Company | 64 |
| Gleason Works | 3 |
| Goss & DeLeeuw Machine Company | 240 |
| Grant Gear Works Inc. | 278 |
| Grant Manufacturing & Machine Company | 345 |
| Gray Company, G. A. | 28-29 |
| Greenfield Tap & Die Corporation | Insert Facing 204 |
| Greenlee Brothers & Company | 303 |
| Grieder Industries | 352 |
| Gulf Oil Corporation | 56-57 |
| Hannifin Corporation | 264 |
| Hardinge Brothers, Incorporated | 52 |
| Haynes Stellite Company; Division Union Carbide Corporation | 189 |
| Heald Machine Company, Sub. Cincinnati Milling Machine Company | 2nd Cover |
| Heller Tool Company | 66-67 |
| Hendey Division of Barber Colman Company | 92-93 |
| Hill Acme Company Acme Machine Division | 306 |
| Horton Chuck Division Greenfield Tap & Die Corp. | 83 |
| Inland Steel Company | 314 |
| Johansson, C. E. Division of Swedish Gage Company | 280 |
| Johnson Manufacturing Corp. | 324 |
| Jones and Lamson Machine Company | 191, 193, 195, 197, 199 |
| Jones and Laughlin Steel Corporation | 301 |
| Kearney & Trecker Corporation | 218-219 |
| Kennametal, Inc. | 312 |
| Kent-Owens Machine Company | 305 |


*(Continued on page 348)*


## TRIPLE THE USEFULNESS OF YOUR M&M KEYSEATER AND VERTICAL CUTTING MACHINE

**Simple modification greatly increases productive capacity of this versatile machine.**

An M & M Hydraulic Keyseater is not only a keyseater that cuts internal keyways up to 5" wide but a vertical cutting machine as well. Serrations, grooves, teeth—a wide variety of cuts can be rapidly made on this machine with only one simple modification — a work-holding table. This table is now available at moderate cost. If you now own an M & M Hydraulic Keyseater or are considering the purchase of a new keyseater it will pay you to get the facts. Write for Bulletin 19 entitled, "Converting the M & M Keyseater into a combination Keyseater and Vertical Cutting Machine".




**M&M KEYSEATERS AND VERTICAL CUTTING MACHINES**

98

**MITTS & MERRILL** • 104 Holden Street • SAGINAW, MICHIGAN

**LASSY TAPPERS**

New exclusive features and top quality make Lassy Tappers outstandingly the finest available, for the tool room—small lot production — and the problem jobs. A low priced investment that soon pays for itself.

Write for illustrated circular showing 3 models, and also Universal Tap and Die Guide.

**LASSY TOOL CO.**
Plainville, Conn.

# TO INCREASE PRESS EFFICIENCY

## MINSTER® CLUTCHES FOR PRESS CONVERSIONS

Combination Clutch and Brake unit mounted on crankshaft within flywheel as supplied for flywheel type gap or straight side presses.

**MINSTER Combination Air Friction Clutch and Brake — made by a press manufacturer who knows your problems.**

Combination Friction Clutch and Brake unit mounted on drive shaft within flywheel for geared presses.

***Here's why it is profitable to convert to Minster Clutches:***

- Eliminates down time because of clutch failure
- Reduces maintenance by eliminating costly and frequent parts replacement
- Increases die life because of smooth, shock-free clutch engagement
- Reduces operator fatigue and improves safety because press is easier to operate, easier to control
- More productive cycles per hour on single cycle operation
- Easier, more rapid die setting

**Investigate** the advantages of the Minster patented Combination Air Friction Clutch and Brake if you are considering modernizing your machines. Naturally, a new clutch unit will not make a new machine out of your old press. However, if your equipment is in good condition, or can be reconditioned reasonably, a Minster Clutch is the most profitable way for you to increase efficiency.

**Ready to install:** Minster conversion units are standard clutches, individually applied to your press. You receive the unit engineered to fit your press, complete with new flywheel and shaft as needed, ready to drop into place. This eliminates costly remachining and reworking of parts, saves down time for converting. A wide selection of Minster built electrical control systems is available.

**Bulletin CC 57** describes Minster Clutches for press conversion. Copy by request on company letterhead.

**THE MINSTER MACHINE COMPANY**
MINSTER, OHIO


## From the *American Machinist* Library of Tips for Top Shop Men

ARE you lugging materials to and from a machine for a minor operation that should be done where the material is? Check facing to length, centering, cut off, plain grinding. If volume is large, it may be cheaper to move the machine once and for all rather than moving the material continuously.

## INDEX TO ADVERTISERS

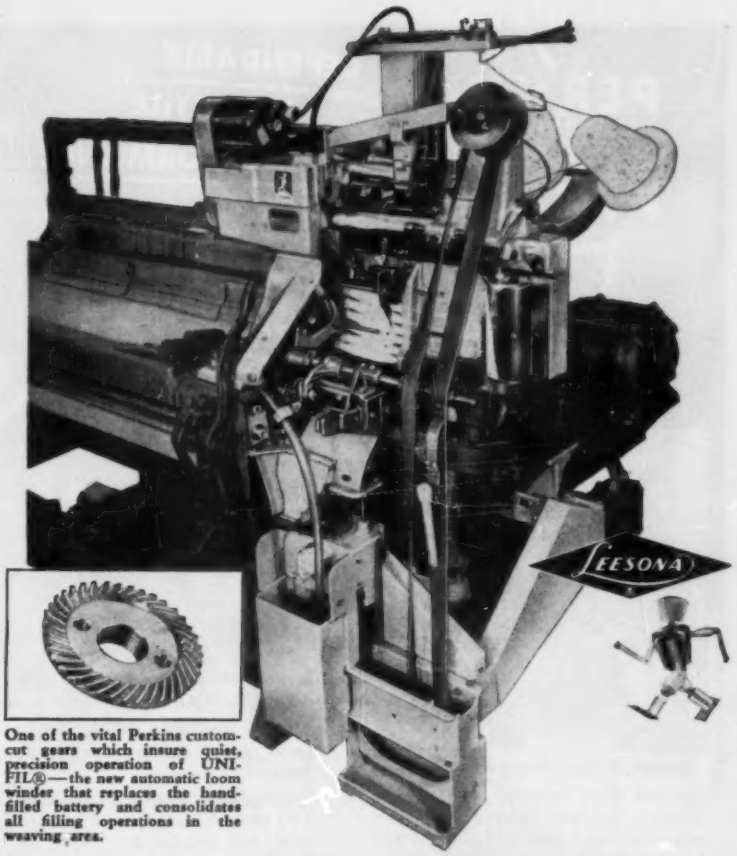
(*Continued from page 347*)


| | Page |
|---|---|
| Kingsbury Machine Tool Corporation | 272 |
| Knight Machinery Co., W. B. | 313 |
| Lake Erie Machinery Corporation | 238-239 |
| Laminated Shim Company, Inc. | 213 |
| Landis Machine Company | 10-11 |
| Landis Tool Company | 12-13, 21 |
| LaPointe Machine Tool Company | 26-27, 212 |
| Lassy Tool Co. | 347 |
| Lavallee & Ide Inc. | 94 |
| LeBlond Machine Tool Company, R. K. | 58-59 |
| Linley Brothers Company | 278 |
| Lodding Incorporated | 351 |
| Lodge & Shipley Company | 34 |
| Logan Engineering Co. (Lathe Division) | 295 |
| Lovejoy Tool Company, Inc. | 330 |
| Lufkin Rule Company | 268 |
| Madison Industries, Inc. | 292 |
| Mahon Co., R. C. | 201 |
| Manhattan Rubber Division Raybestos-Manhattan Inc. | 304 |
| Master Electric Company | 108 |
| Mattison Machine Works | 315 |
| Mayline Company, Inc. | 332 |
| M.B.I. Export & Import Ltd. | 36 |
| McCrosky Tool Corporation | 345 |
| McGraw-Hill Book Company, Inc. | 335 |
| Melborn Co. | 326 |
| Metal Carbides Corporation | 294 |
| Metallurgical Products Department General Electric Company | 24-25 |
| Micrometrical Manufacturing Company | 242 |
| Micro Switch Division Minneapolis-Honeywell Regulator Company | 293 |
| Mid-West Abrasive Company | 234 |
| Minganti & Company, Guiseppe | 326 |
| Minnesota Mining and Manufacturing Co. | 331 |
| Minster Machine Company | 70-71, 348 |
| Mitts and Merrill | 347 |
| Modern Industrial Engineering Co. | 333 |
| Monarch Machine Tool Company | 88-89 |
| Murray Way Corporation | 254 |
| National Acme Company | 33, 46 |
| National Automatic Tool Company, Inc. | 48 |
| National Machine Tool Company | 264 |
| National Tube Division | 45 |
| New Britain Machine Company | Insert Bet. 68 and 69 |
| New Jersey Zinc Company | 20 |
| Niagara Machine & Tool Works | 65 |
| Nicholson File Company | 203 |

# INDEX TO ADVERTISERS


| | Page |
|---|---|
| Noble & Westbrook Manufacturing Co. | 96 |
| Northfield Foundry & Machine Company | 324 |
| Norton Company | 18-19, 39, 47 |
| O.K. Tool Company, Inc. | 3rd Cover |
| Oakite Products Inc. | 263 |
| Oliver Corp., A. B., Farquhar Division | 236 |
| Oliver Instrument Company | 250-251 |
| O'Neil-Irwin Manufacturing Company | 219 |
| Packer Machine Company | 346 |
| Perkins Machine Co. | 350 |
| Perkins Machine & Gear Company | 349 |
| Pines Engineering Company, Inc. | 298 |
| Pioneer Aluminum, Inc. | 258 |
| Portage Machine Co. | 310 |
| Potter & Johnston Company, Sub. Pratt & Whitney Company, Inc. | 73 |
| Pratt & Whitney Company, Incorporated | 220-221, 224-225, 228-229 |
| Precision Welder & Flexopress Corp. | 307 |
| Producto Machine Company | 273 |
| Railway Express, Air Express Division | 268B |
| Randall Company, Inc., Frank E., | 328 |
| Raybestos Manhattan, Inc. | 304 |
| Reed Rolled Thread Die Company | 97 |
| Reliance Electric & Engineering Co. | 291 |
| Rivett Lathe & Grinder Inc. | 32A |
| Robbins Company, Omer E. | 217 |
| Rockford Die & Tool Works, Inc. | 326 |
| Rotary Lift Company | 322 |
| Ruthman Machinery Company | 266 |
| Ryerson & Sons Inc., Joseph T. | 172 |
| S. P. Manufacturing Corporation | 209 |
| Scherr Company, Inc., George | 344 |
| Sciaky Bros., Inc. | 327 |
| Scott Paper Company | 318 |
| Seibert & Sons, Inc. | 286 |
| Sharon Steel Corporation | 249 |
| Sheffield Corporation | 44, 326 |
| Sheldon Machine Company | 247 |
| Sidney Machine Tool Company | 207 |
| Sigourney Tool Company | 322 |
| Simonds Saw & Steel Company | 69 |
| Smit & Sons Inc., J. K. | 246 |
| Snyder Tool & Engineering Company | 30-31 |
| Socony Mobil Oil Co., Inc. & Affiliates | 222-223 |
| South Bend Lathe Works | 329 |
| Sperry Products Inc. | 330 |
| Square D Company | 289 |


*(Continued on page 350)*


One of the vital Perkins custom-cut gears which insure quiet, precision operation of UNIFIL®—the new automatic loom winder that replaces the hand-filled battery and consolidates all filling operations in the weaving area.

## Perkins Custom-Cut Gears Specified for Universal Winding's New Unifil® Loom Winder

Quality and service determine Universal Winding Company's choice of Perkins custom-cut gears for many of their machines, including the new UNIFIL®. Perkins gears are precisely cut to exact specifications which eliminate noise, wear and backlash. This means fewer rejects, lower maintenance cost and longer gear life. Extensive facilities and modern equipment, backed by 52 years of gear-making know-how insure prompt delivery, as scheduled, to meet production needs. You, too, can benefit from Perkins *quality* and *service*. Perkins can cut your gears from any material — metallic or non-metallic. If you require a special deep or shallow pitch, a gear with a hub, clutch teeth or other special features, Perkins engineers will work with you to insure efficient and economical gear design. Ask us to quote on your next gear requirement.

**YOURS ON REQUEST** — Folder illustrating gears Perkins has made — face gears, generated and curvic clutches; bevel, spiral, helical and spur gears; ratchets, sprockets and ground thread worms . . . from all materials. Includes Perkins facilities for producing various gear types and sizes. *Write today.*

**PERKINS**
**MACHINE AND GEAR CO.**
Dept. 16, West Springfield, Mass.
Telephone: REpublic 7-4751

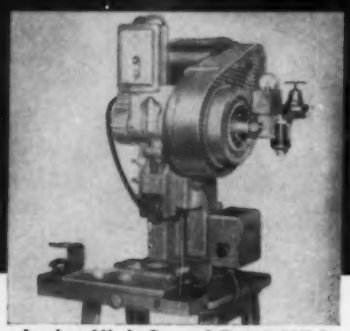
# PERKINS *Junior* PRESSES

**DEPENDABLE**
**VERSATILE**
**TOP PERFORMANCE**

The Perkins Junior is a precision built machine. Costly dies can be run in these little presses with perfect confidence. A variety of frames is available giving whatever die space may be required.

**Junior Press With Roll Feed**

The use of a feed roll will tremendously increase production. An accurate feed roll is available for Perkins Junior presses. The Junior roll feed will take material up to 2" in width and feed from 0 to 3¾". The feed can be mounted on a bolster plate and easily attached to the press. Special feeds for wire are available as well as for extra long work.



**Junior High Speed Press With Combination Air Clutch and Brake**

This is the latest advancement in small press design and performance, it gives:

- Single tripping with speeds up to 600 rpm with dual hand buttons for safe, fast production.
- Continuous running with adjustable top stop control.
- Less maintenance—no clutch dogs or wheel inserts or springs to replace.
- Surprisingly low cost for the complete unit.

Investigate this latest advancement in a fast, safe press.

**PERKINS MACHINE COMPANY**
Tel. HEMlock 6-7711
**50 PERKINS STREET, WARREN, MASS., U.S.A.**


## From the *American Machinist* Library of *Tips for Top Shop Men*

THERE'S always a way. Remember the college that got a bequest of several hundred thousand dollars for a new girls' dormitory — which the will stipulated must be surrounded by a 20-ft wall. A smart trustee suggested the bequest be accepted and the dorm be built—with the wall in a 20-ft trench.

## INDEX TO ADVERTISERS

*(Continued from page 349)*


| | Page |
|---|---|
| Stahl Gear & Machine Company | 302 |
| Standard Gage Company | 325 |
| Standard Oil Company, (Indiana) | 274-275 |
| Standard Pressed Steel Company | 62-63 |
| Stewart-Warner Corporation | 317 |
| Stuart Oil Co, Ltd., D. A. | 98-99 |
| Supreme Products Corp. | 260 |
| Taft-Peirce Manufacturing Company | 42-43 |
| Tannewitz Works | 302 |
| Tennessee Coal & Iron Division | 45 |
| Texas Company | 110 |
| Timken Roller Bearing Company | 4th Cover |
| Tomkins-Johnson Company | 113 |
| Torit Manufacturing Company | 320 |
| Torrington Manufacturing Company | 76-77 |
| Triplex Machine Tool Corporation | 334 |
| Union Carbide Corporation | 189 |
| Union Twist Drill Company | 84 |
| U. S. Steel Company | 45 |
| United States Steel Corporation | 45 |



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# INDEX TO ADVERTISERS


| | Page |
|---|---|
| U. S. Steel Export Company | 45 |
| United States Steel Supply Division | 45 |
| U. S. Tool Company, Inc. | 32D |
| V & O Press Company Division Emhart Mfg. Co. | 319 |
| Valvoline Oil Company, Division Ashland Oil and Refining Company | 282 |
| Van Norman Machine Company | 8-9 |
| Veeder-Root Inc. | 32 |
| Verson Allsteel Press Company | 166 |
| Vickers Inc. Div., Sperry Rand Corp. | 284 |
| Vlier Engineering Corporation | 233 |
| Waldes Kohinoor Inc. | 279 |
| Warner & Swasey Company | 22-23 |
| Wells Manufacturing Company | 243 |
| Wesson Company | Insert Bet. 236-237 |
| Westinghouse Electric Corporation | 60-61, 241 |
| Whistler & Sons, Inc., S. B. | 332 |
| Whitman & Barnes Inc. | 252 |
| Williams-White & Co. | 334 |
| Wilson Mechanical Instrument Division, American Chain & Cable Company, Inc. | 320 |
| Yoder Company | 280 |
| Youngstown Sheet & Tube Company | 323 |


## CLASSIFIED ADVERTISING

**F. J. Eberle, Business Mgr.**


EMPLOYMENT OPPORTUNITIES ..... 341

EDUCATIONAL
Books ..... 341

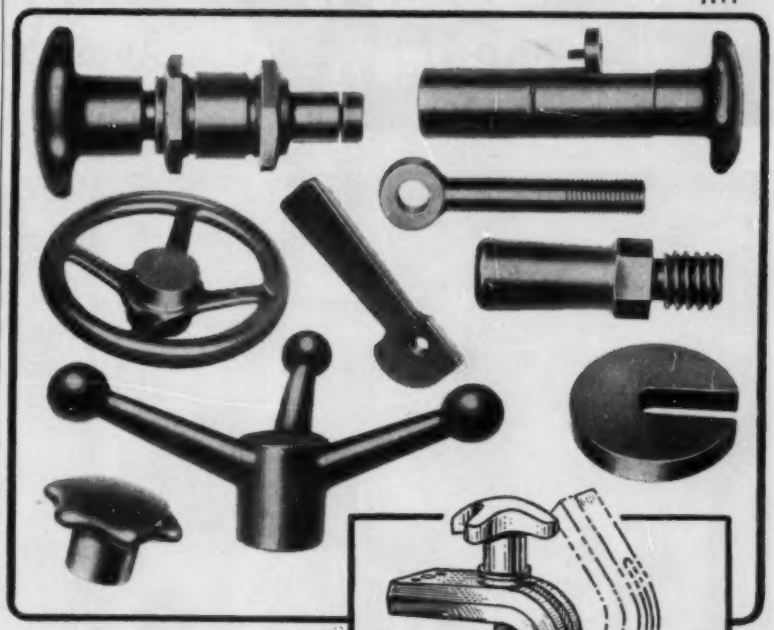
EQUIPMENT
For Sale ..... 336-341

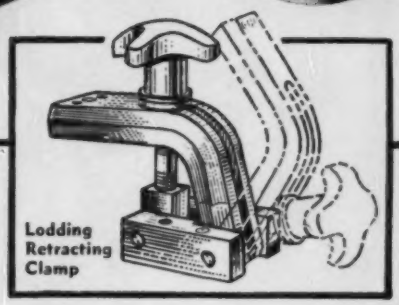

ADVERTISERS INDEX


| | |
|---|---|
| Bennett Machinery Co. | 340 |
| Braun Gear Co. | 340 |
| Cincinnati Machinery Co. | 340 |
| Clifton Hydraulic Press Co. | 340 |
| Dony Machinery Co., D. E. | 340 |
| Eastern Machinery Co., The | 339 |
| Falk Machinery | 338 |
| Hazard Brownell Machine Tools Inc. | 339 |
| Hill-Clarke Machinery Co. | 338 |
| Hyman & Sons, Joseph | 340 |
| Machine Tool Publications | 340 |
| McDonald Machinery Co. | 340 |
| Miles Machinery Co. | 339 |
| Morey Machinery Co., Inc. | 337 |
| National Machinery Exchange | 340 |
| Noll Equipment Co. | 340 |
| Press & Shear Machinery Corp. | 338 |
| Sal Metal Products Co. | 340 |
| Scherer Corp., R. P. | 339 |
| United Machinery & Tool Corp. | 336 |
| Wheeler, C. H. | 341 |



# You Cannot Afford To Make Your Own






Standardized Components that a toolmaker would take hours or days to make, are ready for you at your Lodding distributor.

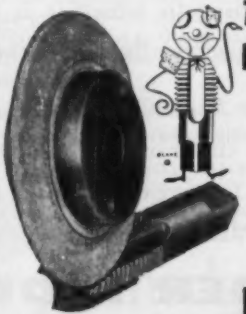
Four sizes each of four styles — hand knob, hand cam, nut and air operated.

**LODDING, INC.**
**WORCESTER 1, MASS.**

Precision Tool Sales
417 E. Florence Ave.
Los Angeles 3, Calif.

FACTORY WAREHOUSES

Bagby Engineering Co.
1047 Forest Ave.
Evanston, Ill.



*Controlled Grinding of Tap Flutes and Chamfers*

## *To Cut Your Tapping Costs,* GRIND and RE-GRIND YOUR TAPS ACCURATELY!

Use these basic hook angles as a starting point for better tapping.

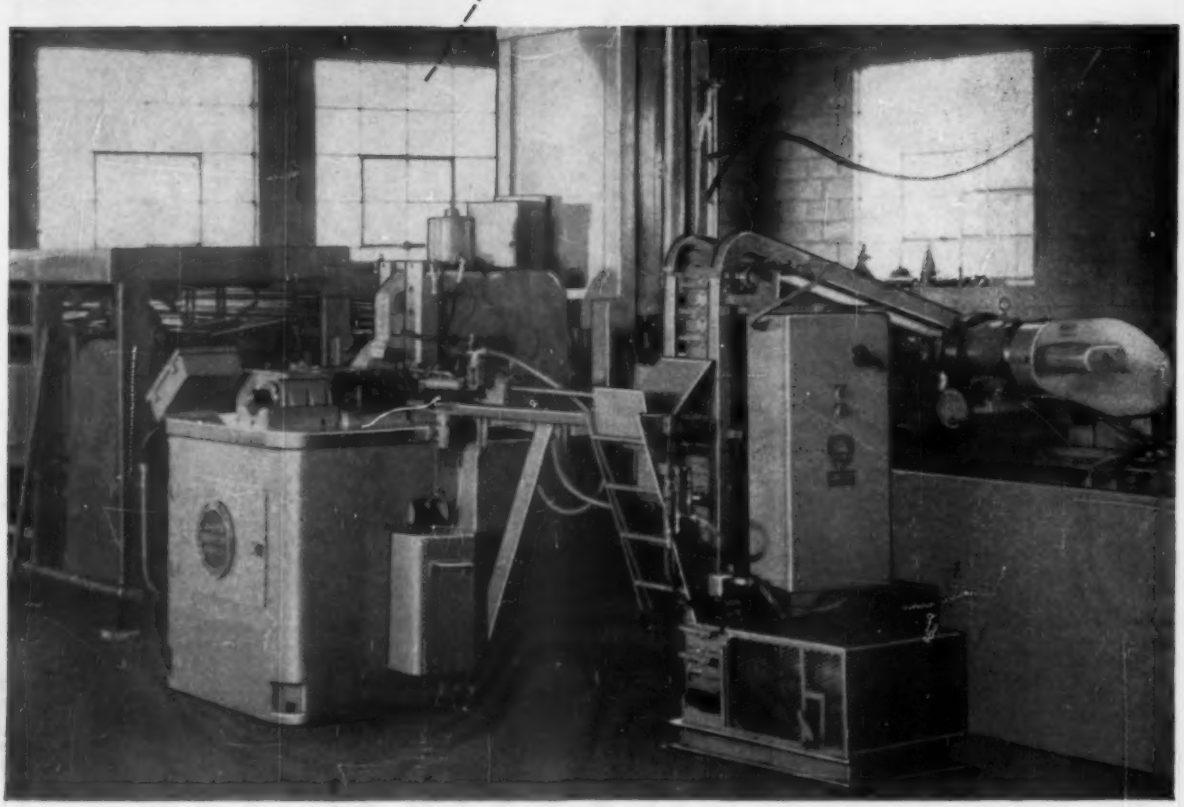
| | | | | | |
|---|---|---|---|---|---|
| Aluminum | 18° | Cast Iron | 5° | Brass | 5° |
| Copper | 18° | Magnesium | 18° | Plastics | 8° |
| Mild Steel | 8° | Stainless Steel | 12° | | |

Write for specific details on how the BLAKE Flute and Chamfer Grinders give you the accuracy you need for low tapping costs.

EDWARD **BLAKE** COMPANY INC.
435 CHERRY ST., WEST NEWTON 65, MASS.

# One Grieder Tube Cut-off Machine Is Producing...

## 2400 Crankcase Filler Tubes Per Hour For A Major Automobile Manufacturer



**Tube Specifications**

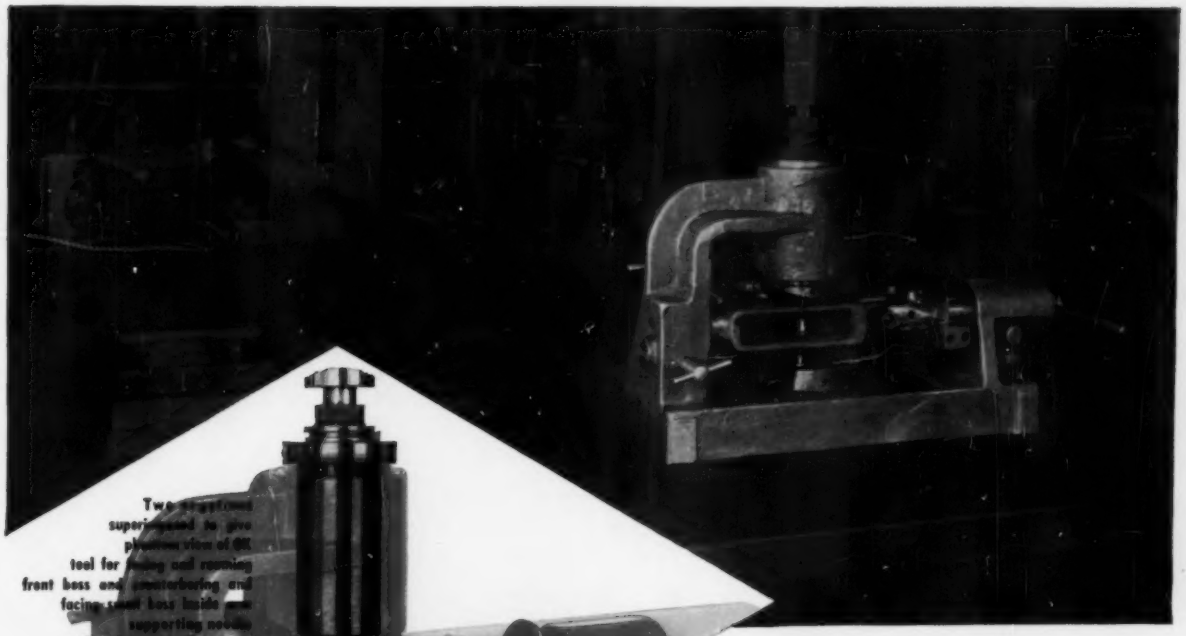
Mechanically welded 1⅜" OD, .035" wall thickness, mild steel supplied in 22' lengths. Cut off in lengths of 9.070" plus or minus .002" with both ends finished burr free.

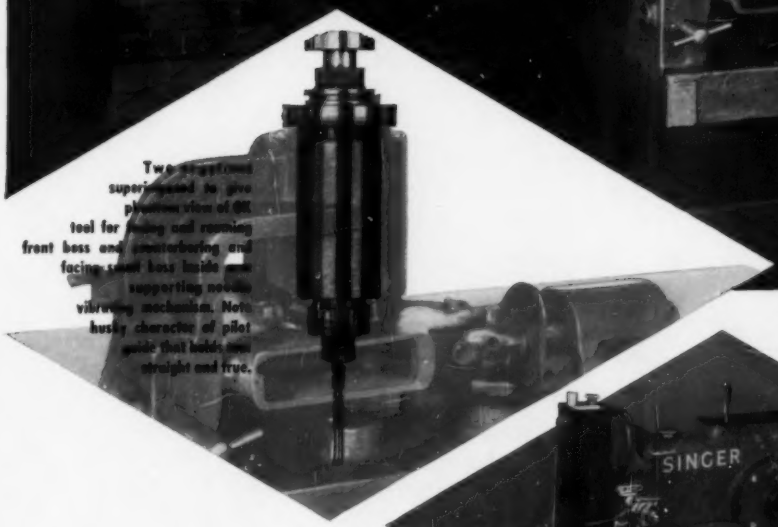
The Grieder Tube Cut-off Machine cycling at the low end of its 4500 to 6000 pieces per hour rate runs intermittently. Production on this application is limited by the cycling rate of the special end finishing machine to which it is coupled. This complete line of machinery is electrically interlocked for automatic operation.

Grieder Tube Cut-off Machines are made in three sizes to accommodate tubes of any shape from 3/16" to 4" OD. Hoppers for automatic feeding of tubes are available as extra equipment. Write for literature.

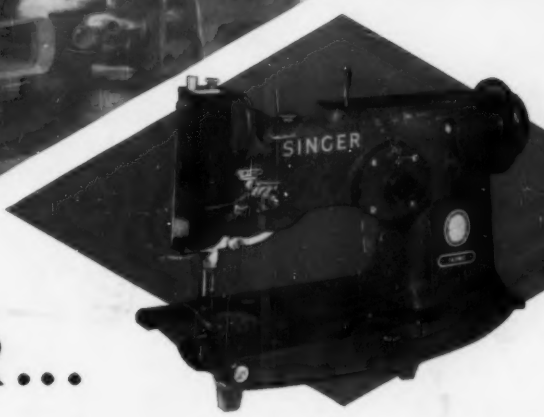
**GRIEDER INDUSTRIES, INC.**

*P. O. BOX 169, BOWLING GREEN, OHIO*





Two operations superimposed to give phantom view of OK tool for facing and reaming front boss and counterboring and facing small boss inside. Note supporting nozzle vibrating mechanism. Note husky character of pilot guide that holds tool straight and true.




Singer Sewing Machines, Class 143W, are used in industry for over stitching seams, binding awnings, finishing sheet goods and foundation garments, shoe linings, pinking shades and attaching lace, applique, flag stars, etc.

# *at* SINGER...

## *four operations with one stroke...+*

**JOB DATA**

Operating speed... 145 rpm

Feed... .013 feet per revolution

Depth of cut... facing, 3/32" reaming, 3/8"

Before Singer acquired these OK two-step piloted reaming and facing tools, downtime ran high. After 300 pieces, tools were out for grinding. Now they get 750 pieces before grinding, an increase of 150 per cent. One man works two spindles, producing 50 units per hour without pushing and maintains tolerances plus and minus .001". Workpiece is a sand molded grey iron casting, not the easiest material to machine. This is one of dozens and dozens of high speed steel and carbide bladed multiple-diameter tools OK has made for Singer. OK tool designing and engineering service is free and it's fast. If you have a tooling problem, why not talk to us about it. Just send us a blueprint, sample or picture with information as to the material, quantities, machines and horsepower available. In a week you will receive a print for approval and in another two weeks the actual tool will be making chips fly.

***FREE — 52 page book of Blueprints of actual multiple-diameter tools designed for combination milling, boring, counterboring, facing and chamfering with one stroke or pass.***

THE OK TOOL COMPANY • 400 Elm Street • Milford, New Hampshire

modern milling cutters *for* modern milling machines

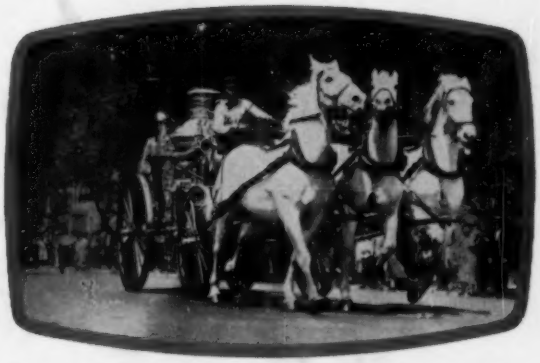
multi-diam tools • reamers • boring heads • form cutters

# SEE TIMKEN TELEVENTS ON NETWORK TV

## Two big hour-long spectaculars this fall

**Over 126 NBC STATIONS, SEPTEMBER 23rd**

**"Eleven Against the Ice"**, the story of the Antarctica Turnpike. See men and machines build a trail across Antarctica's frozen wastes—in spite of 200 mph winds, temperatures of 120 degrees below zero and crevasses big enough to swallow a 20-story building. It's a triumph of engineering and human courage, a whale of a television show.

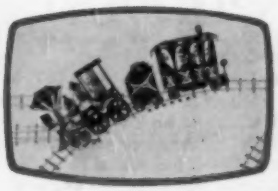


**Over 142 NBC STATIONS, NOVEMBER 21st**

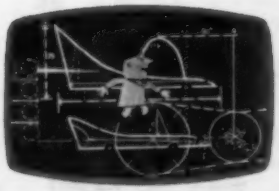
**"The Innocent Years"**. Recaptured from exciting old films and newsreels, you'll see happy days relived. Experience the excitement of "Teddy" Roosevelt, Thomas Edison and Mark Twain in action. Hear songs like: "In the Good Old Summertime", "He'd Have to Get Out and Get Under". Enjoy the fun of family picnics, the joys of people in the last untroubled time in our history.

## And commercials that help you sell . . .

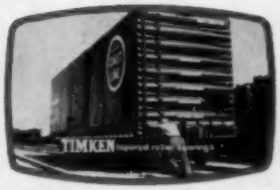
**See** How man stumbled on the concept of the wheel.



**See** Why America's railroads have always led the world.



**See** Why Americans jump for the latest thing in cars.




**See** One man push a freight car all by himself.

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